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THE  
ANGLE SYSTEM  
OF  
Regulation and Retention  
OF THE TEETH.

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THIRD EDITION, REVISED AND ENLARGED.

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BY

EDWARD H. ANGLE, D.D.S.,

Former Professor of Histology and Orthodontia, and Comparative  
Anatomy of the Teeth, in the Dental Department of the  
University of Minnesota.

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1892.

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119 West 57th St., New York

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## CHAPTER I.

### §1.—ANGLE'S SYSTEM OF REGULATING AND RETAINING APPLIANCES, SET No. 1.

WE frequently see it stated by writers, and some who would like to be considered an authority on the treatment of dental irregularities, that no fixed system of appliances should be depended upon, but an appliance invented to suit the requirements of each case.

We know that these statements are erroneous, and are undoubtedly productive of much harm, for they serve only to prevent system and progress. And such assertions cannot fail in time to react on their authors. For they will be quoted by future writers to illustrate how defective was their knowledge of the subject.

We know that it is possible, practical, and even easy, to so systematize and classify appliances to a few simple forms, as to meet the requirements of all varieties of cases which are susceptible of treatment.

In proof of which we submit this system, and as further evidence invite inspection of our private collection of models of cases, which correctly show each stage of the operation from beginning to completion, in the treatment of which, in no instance did we use other than the appliances shown in the Sets Nos. 1 and 2, and in only but few instances did we find it necessary to use other combinations of the appliances than those shown hereafter, and for variety and results we believe this collection will compare with any other one in the world.

We know that to attempt to convince those long accustomed to the plan of devising clumsy and unscientific appliances for each case, that it is possible to so systematize and

classify appliances to meet all requirements, will meet with little favor.

But when the time comes that teachers will recognize that it is not only possible, but most practical, it will be as easy for students to become proficient in this important branch as that of operative dentistry, or any of the different branches now so successfully taught in our colleges. But the present plan of attempting to make proficient practitioners in orthodontia by teaching them to be inventors of, or selectors of, appliances from the chaotic profusion, many of which are only duplicates of others in principle, serves only to confuse, and must always result in the graduate knowing comparatively little about the subject, and being unqualified to scientifically and successfully treat cases.

We believe that there is no branch, which is so unscientifically taught, as is orthodontia to-day.

Much time is devoted by some colleges to the manufacture of appliances by the students, but we believe that the time could be far more profitably spent in real clinical practice, in which the student shall carefully study cases and make application of established forms of instruments, which have been made by experts and are far more perfect than he could ever do himself, just the same as he now makes use of instruments in other branches of dentistry.

Dr. Farrar seems also to have become convinced of the practicability of what I have already stated, for he says in Vol. XX, page 20, of the *Dental Cosmos*:

“It has for some time been evident to me (though by most people thought to be impracticable), that the time will come when the regulating process and the necessary apparatus will be so systematized and simplified that the latter will actually be kept in stock, in parts and wholes, at dental depots, in readiness for the profession at large, so that it may be ordered by catalogued numbers to suit the needs of any case. So that by a few moments’ work at the blow-pipe in the laboratory, the dentist may be able by uniting the parts to pro-



duce any apparatus, of any size desired, at minimum cost of time and money."

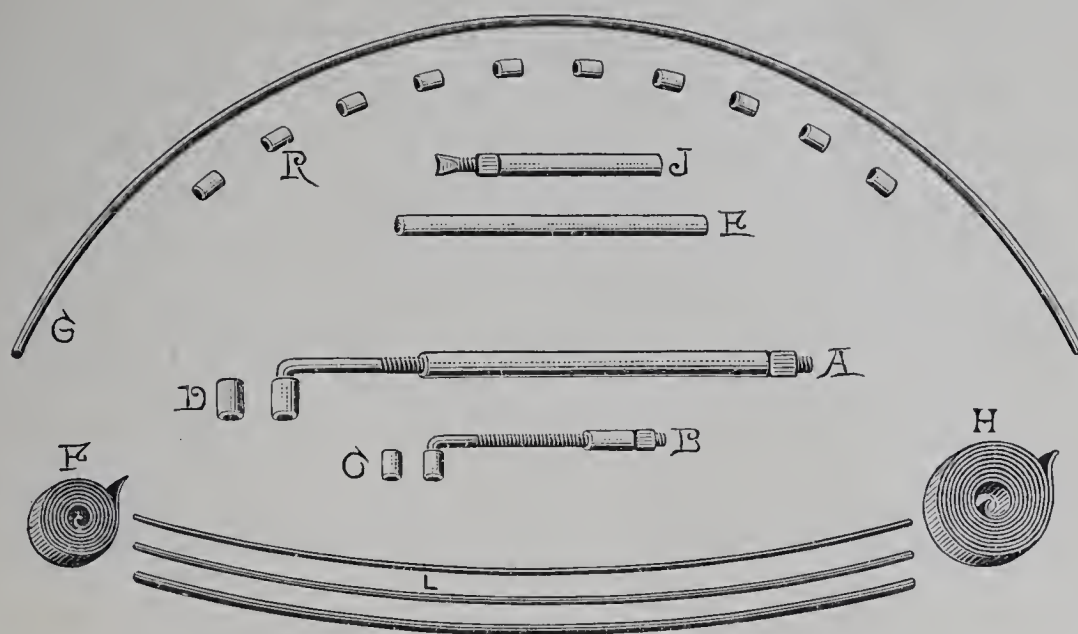


Fig. 1.—Set No. 1, Angle's Appliances.

In preparing the third revised treatise on this system, I have but few changes to make in the appliances, although they have been subjected to many severe tests in the treatment of a large number of cases, many of which were most difficult. Yet we have found that the number of pieces has fully met all the requirements, and the sizes and shapes are so perfect, that we question whether they will ever be changed for the better.

The coils of band material, "F" and "H" are now made thinner; the former being .003 and the latter .004 inches in thickness, which we have found quite sufficient to stand the necessary strain. And the delicate temper of the screws, which is so important, as well as the careful proportions of the material in the sheath, have been brought to the greatest perfection.

But most important is the extreme accuracy with which the seamless tubes fit all the different parts passing through them. This state of perfection has only been reached by much careful experimenting, and more perfect machinery for their manufacture.

We are thoroughly convinced that the attempt of dentists to make the appliances for their own cases, is a serious mistake, as many of the possibilities in their use will be defeated. Perhaps no other instruments used by dentists are subjected to such severe tests as the regulating appliance. As well might the dentist attempt the manufacture of the fine pluggers for packing gold; a practice abandoned long ago by most. And although many may not now agree with me in regard to the manufacture of regulating appliances, yet I fully believe that the time will soon come when this will be acknowledged true.

In the application of the appliances, experience has developed many quicker and simpler ways of adjusting them, as well as better and more efficient combinations, which will be shown later on.

And finally, we have added the very useful adjunct, *viz.*, the clamp band, shown in Figures 7 and 8, and which are so quick and easy of application, and their use so satisfactory, that they will be greatly appreciated by all who use them.

It is not my intention at this time to give a full and complete treatise on orthodontia, but rather to give my own method of accomplishing the different movements in the correct adjustment of malposed teeth, believing that most practitioners will succeed far better by adopting one method, and thoroughly familiarizing themselves with the principles of the same, than they will by but a general understanding of the almost innumerable methods and appliances which have been brought out from time to time.

To those who wish to pursue the subject as to the Etiology, together with the history of methods and appliances in general, I would recommend the excellent works on the subject by Drs. Guilford and Kingsley.

## § 2.—FUNDAMENTAL PRINCIPLES.

In studying the construction and application of any system, having for its object the treatment of dental irregularities, the fundamental principles will be more easily understood, if



we remember that the movements in regulating are limited to one or more of the following:

Forward in line of arch; backward in line of arch; from without, inward; from within, outward; rotation, and occasionally elongation or depression. The physiological principles governing all these movements are the same, so that by understanding the principles governing one, we may comprehend all.

In applying force to a tooth, it should be direct, and sufficient to accomplish the desired movement as rapidly as is consistent with the physiological law, governing the absorption of bone in each case. This law varies so greatly with different individuals, and at different ages, that no fixed rate can ever be established. The judgment of the operator must determine. But in no instance must the pressure exerted be great enough to occasion pain; if so, the normal rate of absorption is interfered with.

A very safe rule to apply, whether the pressure be constant or irregular, is to see that it in no instance exceeds a snug feeling. I am convinced that this feeling is the true indication of the proper amount of force.

Another very important principle which should always be borne in mind while performing the movements of a tooth is, that pressure should never be wholly relinquished.

The movements of a tooth may be arrested as often as is necessary, but never allowed by reason of removal of pressure, to spring backward, thus interfering with the process of repair.

I am convinced, that disregarding this principle (as has usually been necessary in the ordinary regulating appliances, by reason of the faulty principles on which their construction has been based, necessitating their frequent removal for purposes of modification and cleansing) has been the occasion of nearly all the pain and soreness in regulating.

The result of this, in many cases, has been discouragement on the part of the patient, and much annoyance and

frequent failure on the part of the operator. The movement of a tooth, if intelligently accomplished, is painless.

Another very important principle to be remembered is, that support and perfect rest are essential to a tooth after it has been moved into the desired position.

Any appliance for retaining a tooth, which necessitates its frequent removal, should never be used, except in those cases represented by Fig. 48. Again, a retaining appliance should be so delicate, that it may be worn without inconvenience to the patient, until perfect firmness has been established, and should never be under the control of the patient. It may be needless to remark, that a tooth so retained, will become firm in its new position much more speedily than if subjected to occasional disturbances. It is believed that the following system of treating dental irregularities enables the intelligent operator to easily fulfill the requirements so far enumerated.

In deciding upon a proper course of treatment in any given case, much care and judgment should always be exercised, besides a careful study of the features and the due consideration of the probable modifying effects of the proposed changes, the establishment of correct occlusion, etc.

A valuable assistance will always be found in first obtaining very accurate models of both jaws, and correctly articulating the same.

Such models not only assist in forming a basis for correctly establishing the proper line of operation, but are exceedingly valuable as reference during the whole course of treatment, for, from such models, accurate measurements may be taken from time to time, and comparisons may be made with the teeth as the case progresses.

In this way we may not only judge of the exact speed of the moving teeth, but unfavorable movements of the anchor teeth may be detected.

In order that these models may be of any value, they must not only accurately show the positions of the teeth and



cusps, but they must also indicate the rugæ, gums, and as much of the roots and positions of the same as indicated by the gums and alveoli, up to the point where the attachments of the muscles render obscure the further shape of the jaw.

From the large number of imperfect models which I have received from dentists, I am of the opinion that the value of correct models is not sufficiently appreciated.

After trying all kinds of impression materials and different methods of taking impressions, I am well satisfied that the best material is Teague's Impression Compound or Plaster, and it should be used as follows:



Fig. 2.—The Author's Impression Cups for Irregularities.

In the first place, the impression cups for sale at the different dental depots are all incorrect and ill-adapted to the purpose of obtaining impressions of a jaw containing full dentures, for the reason that they are intended for taking

impressions of edentulous jaws. The rim of these cups, as well as the portions covering the palatine process, are entirely too low; they should be much higher.

By obtaining a few sizes of the cups, as represented in Fig. 2, the difficulty of taking impressions high or low (depending whether it be the upper or lower jaw) is wholly obviated.

When a cup suitable to the case has been selected, it should be slightly oiled or coated with a film of fine castile soap, which can be easily accomplished by moistening a small pledget of clean cotton in water, rubbing it over a piece of castile soap, and then over the cup.

When the impression plaster has been mixed to the usual consistency, and distributed in the cups nearly as it should appear after the impression is taken, and the patient provided with a clean towel about the neck, has been instructed to sit upright, the mouth is opened and the cup inserted. The head should be somewhat thrown forward to prevent the plaster from falling into the throat. The cup should be pushed up first at the heel, then the lips raised and the anterior part of the cup forced well into position; then the lips should be drawn down well over the edge of the cup, and a slight pressure exerted from the outside, in order to force the plaster well up against the muscles. The plaster should be allowed to become hard and thoroughly set, after which the cup and all surplus pieces of plaster should be carefully removed, leaving the impression still in the mouth. With the blade of a penknife cut two grooves in the impression, the position of the grooves being parallel to the lines of the axis of the cuspid teeth. These grooves should be quite deep, but not entirely through the impression to the gums or to the crowns.

This being done, the point of the penknife should be inserted in one of the grooves, and, with a quick pry, the external plate of the plaster between the grooves is removed. The plates at the sides can now be broken outward between the



thumb and finger, the line of fracture will follow the cutting edges of the teeth, then the large piece of plaster covering the roof of the mouth is readily worked loose and removed in one piece.

If the operation has been carefully performed, the impression will consist of but four pieces.

After drying a few moments, they are easily replaced in their proper positions in the order in which they were removed, and secured by wax, or, better still, moistening the edges of the fracture with celluloid, dissolved in ether, as suggested by Dr. Van Duzee.



Fig. 3.—Impression Reunited.

*Never attempt to reunite the pieces by replacing in the cups.*

The impression should now appear as shown in Fig. 3.

Not longer than one-half hour after the impression has been taken, the inside should be thoroughly coated with shellac varnish; at the expiration of another half hour it is again coated with sandaric varnish, and, at the end of still another half hour, it should be very carefully filled with plaster, and turned upside down on a glass slab.

After the plaster is thoroughly set, the pieces of the impression may be usually very readily separated in the same order in which they were removed from the mouth.

The model can now be trimmed, and not only will there be a surface as smooth as the most finely polished marble, but each cusp and all the interdental spaces, as well as the rugæ, and even the minute "stipples" of the gum, will be most accurately and beautifully shown. The models should now be neatly labeled and will serve all the purpose of study and reference, besides being valuable as legal evidence.

We now come to another most important principle, which should be remembered in the movement of a tooth, *viz.*: that correct or stationary anchorage should be secured when possible.

Teeth that have been selected as anchorage should be attached in such a manner that tipping and consequent movement would be impossible, or if movement of such a tooth does take place, the anchorage should be so rigid that the tooth must be dragged bodily through the alveolus, the apices of the root moving fully as much as the crown.

This principle is well illustrated in Fig. 4, in which the anchor teeth are banded, and a pipe or sheath, through which the screw pulls, is rigidly attached by means of solder as the band on the anchor teeth is firmly cemented. It will be seen that perfect anchorage is established and consequent tipping of the tooth rendered impossible.

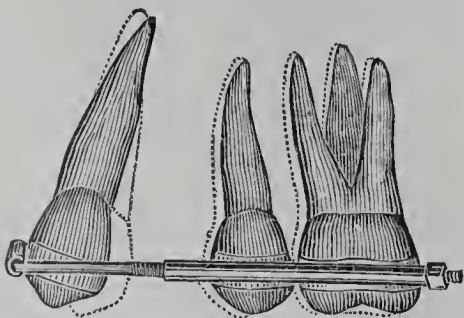


Fig. 4.—Stationary Anchorage.



The dotted lines in the diagram indicate the movements which must take place. Fig. 5 shows the same principle where the motion is pushing instead of pulling. The base of the jack-screw in this case is soldered to the band.

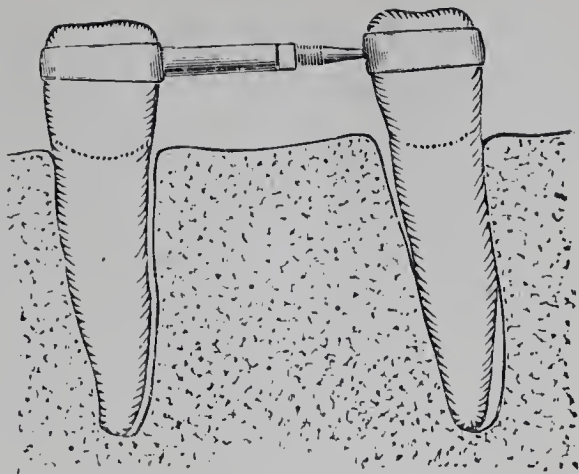


Fig. 5.

It will be readily comprehended how greatly anchorage will be increased, when advantage is taken of this method over the old.\*

Figure 1, Angle's appliances, shows the simple appliances from which all the various combinations used in this system are made. "A" is a large traction screw encased in its accompanying tube, and used for pulling where resistance is great. "B" is a smaller traction screw used in the same way, where resistance is slight, or where, from any reason, a delicate appliance is desired. "C" and "D" are tubes which are soldered to the bands placed upon the teeth to be moved, into which the ends of the traction screw are hooked. "J" is a jack-screw encased in a sheath and used for pushing. "E" is an extra sheath, by means of which a longer jack-screw can be made. "F" and "H" are coils of band material of different thickness. "G" is gold wire used in retaining the teeth, after they have been moved into the desired positions; also to assist in securing an anchorage in some cases. "R" are small retaining tubes designed to be soldered to bands into which the retaining wire fits accurately. "L" are piano-wire levers of varying sizes, giving different degrees of power.

It will thus be seen that the appliances are very simple and few in number, being limited practically to three, *viz.*: the lever for rotating, the screw for pushing, and the traction screw for pulling; the other pieces being for the purpose of

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\* I am indebted to Dr. W. C. Barrett for first suggesting the possibility of this method of anchorage, from which I have derived so much advantage and find so applicable to this system.

securing attachments, and aside from the advantages of simplicity, efficiency, and cleanliness, stationary anchorage, non-relinquishment of pressure, and firm retention may be easily accomplished by their intelligent application.

As it will be seen that the plain band plays so important a rôle in attaching the different parts of the appliances to the teeth, I will here describe the quickest, easiest and most accurate way of making and setting these bands.

First, the rubber-dam should be slipped over the tooth to be banded, and at least one more on each side, and it is usually better to include all the teeth to which the appliance is being adjusted. The surface of the tooth to be banded is then carefully cleaned by means of a pledget of cotton moistened in alcohol or ether. A loop of the band material is then slipped over the tooth.

I prefer German silver to any other metal, on account of its great strength. It can be rolled to extreme thinness, thereby occupying the smallest amount of space. The ends should now be grasped close to the tooth with a pair of closely-fitting, flat-nosed pliers, and the band drawn tightly around the tooth, a strong burnisher being applied at the same time to make it conform still further with the shape of the tooth. Remove the band, which now presents the appearance shown in Fig. 6.

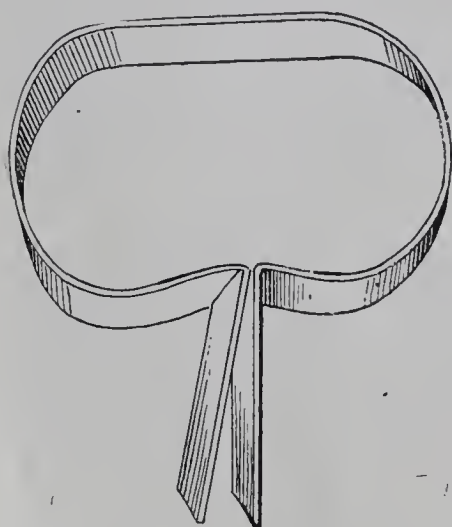
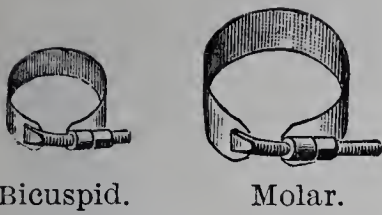


Fig. 6.—Plain Band.  
(Greatly enlarged.)

Place a small bit of silver solder and borax at the junction between the ends, and carry the band in contact with the flame of the soldering lamp. After it is soldered, clip the ends off, and the band is now ready for any attachment which may be made, after which it is cemented in position on the tooth, being gently driven to place by means of a foot-shaped plugger and small mallet.

If the teeth are firmly crowded together, space may be





Bicuspid.

Molar.

Fig. 7.—Angle's Adjustable  
Clamp Bands.

gained for the band by forcing first a thin spatula between them.

Fig. 7 illustrates the author's new adjustable clamp bands, which he now uses almost exclusively in banding the molars and bicuspid, as they are much quicker and easier to adjust and less liable to loosen under strain.

In applying these bands, carefully work the band over the tooth to be encircled, being cautious not to crimp it, and tighten the nut until the band is moderately firm; then burnish until it fits accurately the surface of the tooth in contact with it, and mark the points at which the attachments are to be made. Then loosen the nut and remove the band. After the attachments are made, carefully replace and firmly clamp, but do not tighten the nut enough to strain the thread. Care should also be taken to avoid heating the screw or nut more than is necessary.

It is better to use cement in attaching the band, although it is not absolutely necessary.

These bands are adjustable, and will fit all teeth commonly met with. For abnormally small teeth, cut the band, lap and re-solder. In this way small bicuspid and incisors may be fitted, although the plain band is usually preferred for the incisors. Jeweler's silver solder or 18-karat gold solder, with plenty of borax, should be used for making the attachments.

Fig. 8 illustrates the author's fracture bands.\*

They will also be found very useful in irregularities, and their use explained later in this edition.

We might illustrate, without limit, the different ways of

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\*For author's methods of treating fractures, see Haskell's Student's Manual (second edition), Garretson's Oral Surgery (last edition), and author on Irregularities of the Teeth and Fractures of the Maxillary Bones (now in preparation).



Fig. 8.—Bicuspid. Molar.

attaching and operating these appliances in accomplishing the movements of the teeth, but enough of the many modifications of which they are susceptible will be shown, to enable the average operator to become sufficiently familiar with them to treat all cases.

### § 3.—ROTATION.

The movement of rotation of a tooth is accomplished by means of a lever shown at “L,” Fig. 1. The tooth is banded in the manner already described. One of the small pipes “R,” Fig. 1, is soldered to the labial surface of this band, and the band cemented in position on the tooth; one end of the rotating lever is inserted into the pipe; the other end is sprung around and latched into a hook, soldered to a band, encircling a suitable anchor tooth. Fig. 9 shows a lateral incisor being rotated by this appliance. It will be seen that a powerful and constant force is being exerted upon the tooth to be moved.

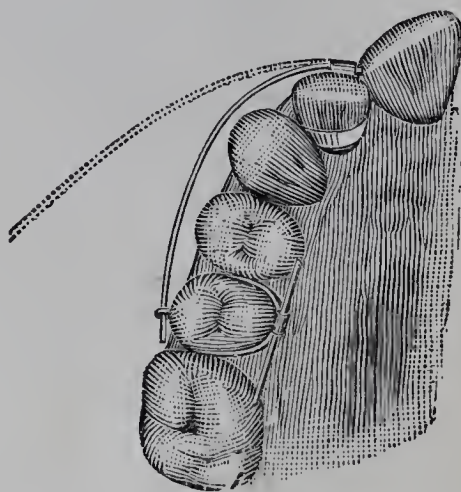


Fig. 9.—Rotation.

The anchor tooth may be reinforced by a piece of the gold wire G, Fig. 1, passing through a pipe soldered to the lingual surface of the band as shown, and the ends of the gold wire resting upon the lingual surfaces of the first bicuspid and molar. The appliance is shown in detail in Fig. 10. After the tooth is in proper position it is retained by means of a short piece of the gold wire, which passes through the tube, and extends upon the central, as seen in Fig. 11. This wire is kept in place by a small pin, which is tightly fitted in a very small hole, drilled through both the tube and one side of the wire, as shown.



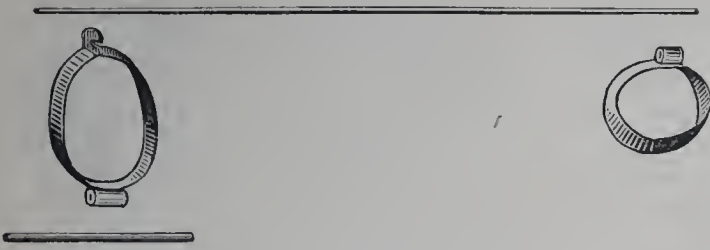


Fig. 10.—Rotating Appliance in detail.

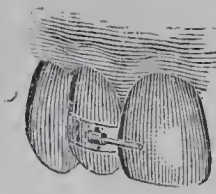


Fig. 11.—Retainer.

Fig. 12 shows two powerful cuspids while being rotated by this method. It will be seen that the lever may be applied with an equal effect upon either the inside or the outside of the arch, and in this case, one anchor tooth is made to serve for anchorage for both levers. It is necessary to exercise both care and judgment in the use of the powerful levers.

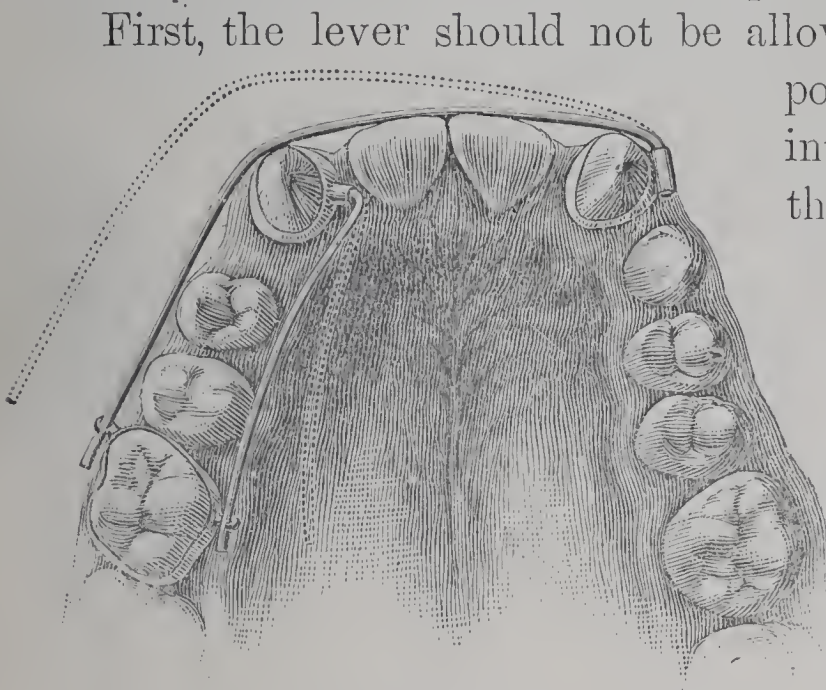


Fig. 12.—Rotation.

point upon the teeth intervening between the tooth being rotated and the anchorage, lest the moving tooth be pried outward; second, care should be taken that the movement is not accomplished more rapidly than the absorption of bone takes place, otherwise the tooth will be sprung outward, by reason of the external plate of the alveolus, which, being thinner, offers less resistance, and will be gradually bent outward.

#### § 4.—DOUBLE ROTATION.

When the teeth are to be rotated in opposite directions at the same time, as the central incisors, shown in Fig. 13, double rotation may be accomplished by one lever.

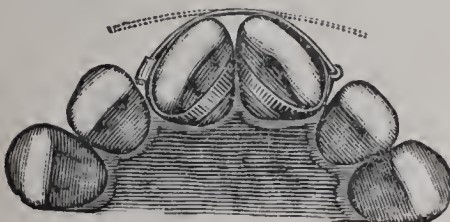


Fig. 13.

Both the teeth are banded, and a tube soldered to each band; one

being horizontal and the other vertical. A piece of the lever "L" Fig. 1 is bent at right angles at one end, and then sprung into position, as seen in Fig. 14.

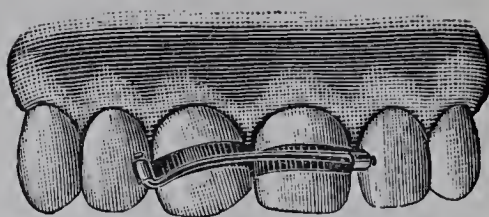


Fig. 14.—Double Rotation.

The tendency of the wire to straighten itself will rotate both teeth at once. Recent experience has shown that a better way of applying the lever is to attach both pipes horizontally, using a straight lever, springing and sliding it into the last pipe in the same manner in which a bolt is slid into position in fastening a door, and correctly shown in Fig. 23.

The piano wire used in making this lever should never be heavier than No. 9, German. *Heavier will not do.* It may be necessary to occasionally remove and straighten the lever a little, in order to maintain the pressure. Should one tooth be rotated sufficiently before the other, further movement may be arrested by removing the band and soldering a lug on the lingual surface, resting against the lateral incisors. And should the teeth in rotating assume too much prominence, by reason of pressure from the adjoining teeth, it may be effectually obviated by requiring the patient to wear, for a few nights, the occipital bandage traction bar, and heavy elastic band shown in cuts 45 and 46, filing a deep notch in the end of the standard to engage the rotating lever. When the teeth are in position they are retained by substituting a piece of the non-elastic gold wire, "G," Fig. 1, for the spring wire, or uniting the bands with solder and recementing.

#### § 5.—BACKWARD IN THE LINE OF THE ARCH.

The backward movement of the teeth in the line of the arch is accomplished by the appliance shown in Fig. 15. The first molar is encircled by a clamp band, Fig. 7, and the tube of the heavy traction screw shown at "A," Fig. 1, rigidly soldered to the band. The cuspid to be moved is banded, and one of the short tubes shown at "D," Fig. 1, is soldered to the band to receive the large traction screw,



"A," Fig. 1. On turning the nut, traction is produced and the cuspid pulled or tipped into place. Fig. 4 shows a side view of the same.

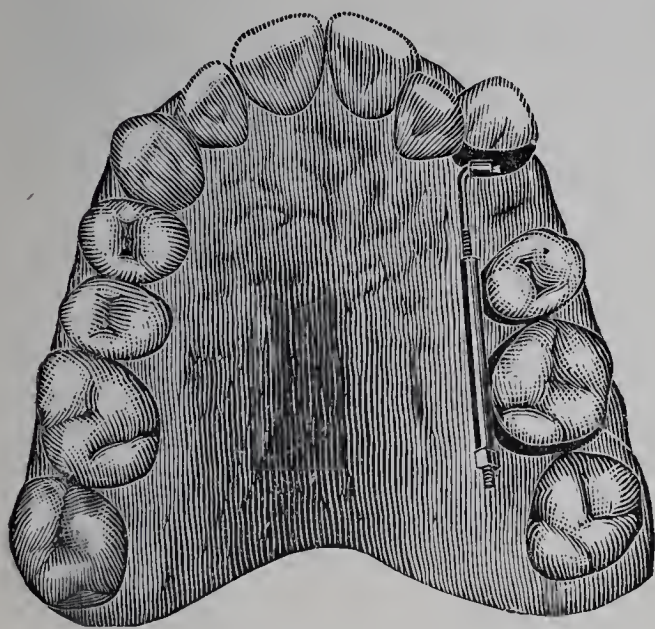


Fig. 15.—Retraction of Cuspid.

It will gradually draw into the pipe as the tooth is moved back, thereby accomplishing both movements. And should the cuspid also require rotating, as is sometimes necessary, it may be accomplished at the same time of retraction, by hooking the angle of the traction screw over a spur soldered at right angles to the band, instead of in the short pipe, thus concentrating all the force in retraction to one side of the tooth. Fig. 38 shows this appliance in position upon the right side.

The easiest way to adjust this appliance is to first cement the band upon the cuspid tooth. After the cement has become thoroughly set, the angle of the traction screw is hooked into the pipe, and the other band is now latched over the molar. The greatest care should be taken to make this attachment accurate, using the strongest cement, as well as a clamp band, on the anchor tooth.\*

The nut should never be tightened enough, at one time, to strain the attachment. Once a day, just enough to occasion a snug feeling, and never more.

After the tooth is moved back it is retained by the screw

---

\* Two anchor bands are shown in the engraving, at Fig. 4, but one is sufficient.

already in position, or that may be removed and a piece of gold wire substituted.

The author feels such a pride in the appliance, that he invites comparison with any other method of performing the difficult movement of retracting the cuspid teeth.

### § 6.—FORWARD IN THE LINE OF THE ARCH.

The movement of a tooth forward, in the line of the arch, is accomplished in the same way, only selecting teeth from the opposite side, to be used in overcoming the resistance of the teeth which are being moved. As in Fig. 34.

### § 7.—OUTWARD.

The movement of a tooth from within, outward in the

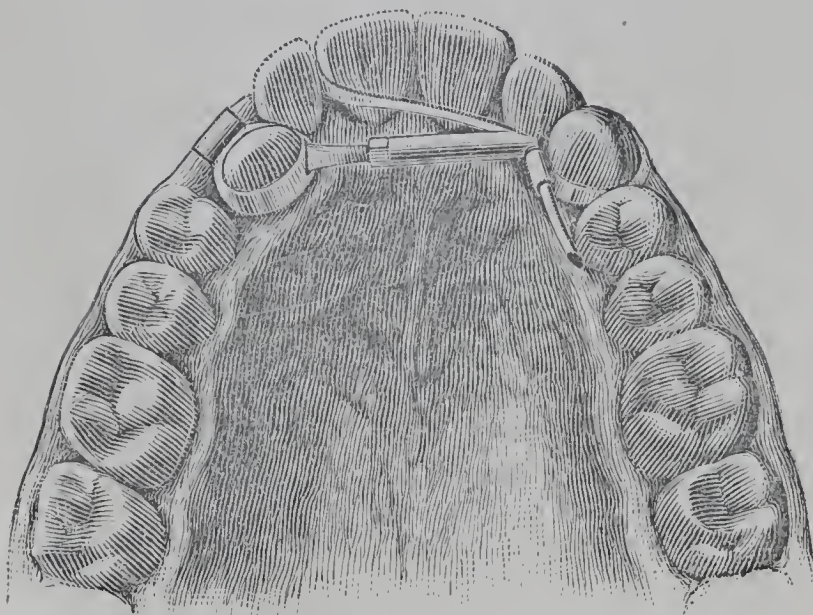


Fig. 16.—Reinforced Anchorage

line of the arch, is shown in Fig. 16, and is accomplished by the jack-screw "J," Fig. 1.

A firm anchorage for the resistance of the screw is obtained by banding and tubing the left

cuspid and passing through the tube a piece of gold wire, long enough to extend to and rest against the adjoining teeth. The opposite cuspid to be moved is banded, and a retaining tube "R," Fig. 1, is soldered to the labial surface.

The lingual surface has a slot cut in it, to receive the flat end of the jack-screw; the other end of the tube in which the screw plays is so notched with a file that it rests securely against the reinforcement wire, and the tube against the lingual surface of the cuspid band. Movement is accomplished



by tightening the nut. After being brought into position the tooth is retained by passing a short piece of the gold wire through the retaining tube on the labial surface, as shown in Fig. 17, which is held in place until the tooth has become firmly set in its new position.

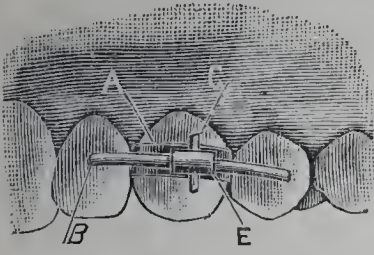


Fig. 17.—Retained.

reinforcing the anchorage where the jack-screw is used in forcing outward an inlocked tooth, is shown in Fig. 18.

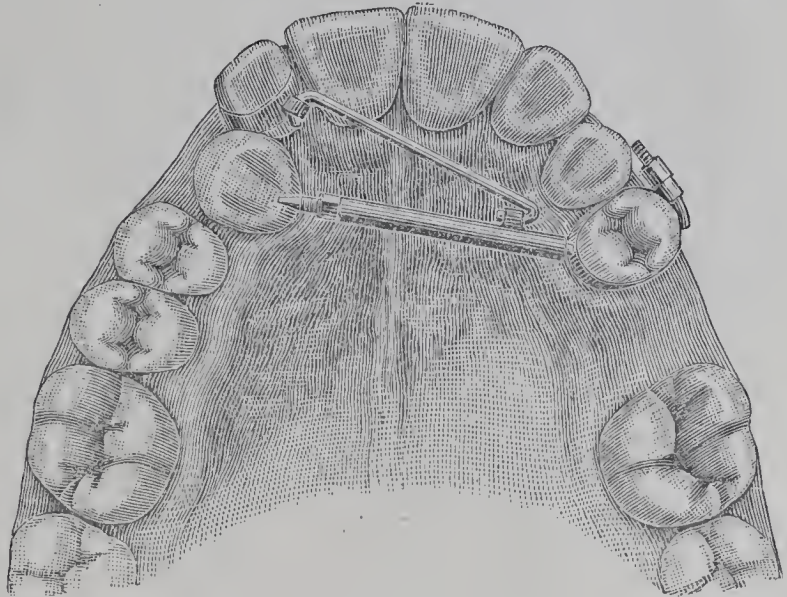


Fig. 18.

The anchor tooth is encircled by a clamp band, having a spur one-eighth of an inch in length soldered to it, over which is slipped the base of the sheath of the jack-screw. The chisel end of the screw resting in a slot in the band encircling the moving tooth as in the cut above, or filed to a sharp point and resting in a delicate pit formed in the enamel. Reinforcement is now gained by hooking a piece of the retaining wire into one of the small pipes "R," Fig. 1,

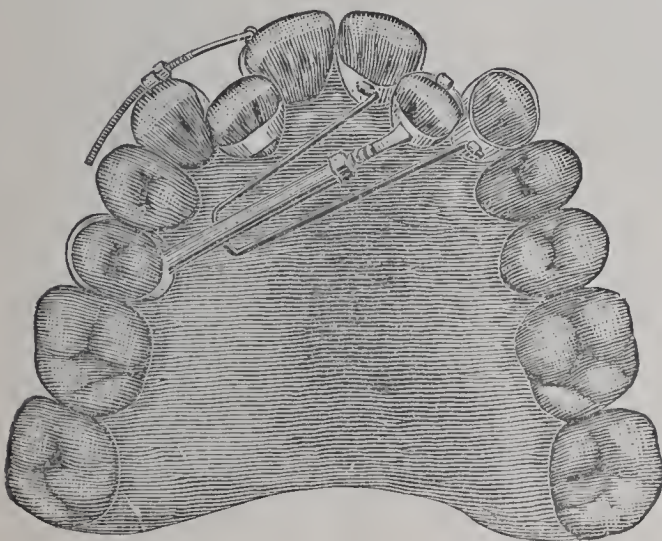


Fig. 19.—Increased Anchorage.

previously soldered to the upper side of the sheath of the jack-screw; the other end is hooked into one of the little pipes soldered to the lingual surface of the band, encircling the lateral incisor. Thus the most perfect anchorage is secured, and by doubling the reinforce-

ment wire, as in Fig. 19, in which a lateral is being moved out, the moving tooth will provide space in the arch for itself, by forcing the adjoining teeth laterally.

Outward movement is accomplished by another simple method, shown on the left of Fig. 19, as follows: A strip of band material shown at "F," Fig. 1, is looped about the malposed tooth, the ends resting upon the labial surfaces of the adjoining teeth.

To one end of this strip is soldered a tube "C," Fig. 1, placed vertically, while to the other end a similar tube is attached horizontally. Into these tubes the small traction screw "B," Fig. 1, is placed, being bent to conform to the shape of the arch, and used in this case to push instead of to pull. This appliance should be frequently tightened, by turning the nut, or it will become loose and give trouble.

The parts of this device are shown separately at Fig. 20. Fig. 21 shows the teeth retained after the case was completed.

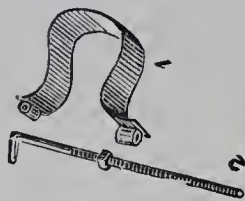


Fig. 20.—Device for Outward Movement.

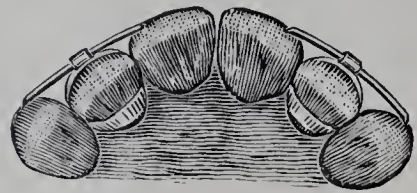


Fig. 21.—Retained.

### § 8.—EXPANSION.

Expansion of the arch is accomplished by banding and tubing the first and last teeth of those to be moved, on each side, and connecting them by means of gold wire passing through the tubes.

The jack-screw is then placed in position across the arch, from wire to wire. Collars or short tubes are soldered to the wires at intervals, to keep the screw in proper position. These collars must be attached by soft solder, that the temper of the wire may not be disturbed. The jack-screw may be moved forward or backward, according to the varying requirements of the case.



Before placing in position the wires which pass along the sides of the arch, they should be bent to correspond to the shape of the sides of the ideal arch, or exactly as we wish the teeth to be arranged, after the desired position is gained. The appliances in positions are accurately shown in Fig. 22, with the exception that the tubes attached to the posterior bands should be oblique, as in Fig. 23, instead of horizontal.

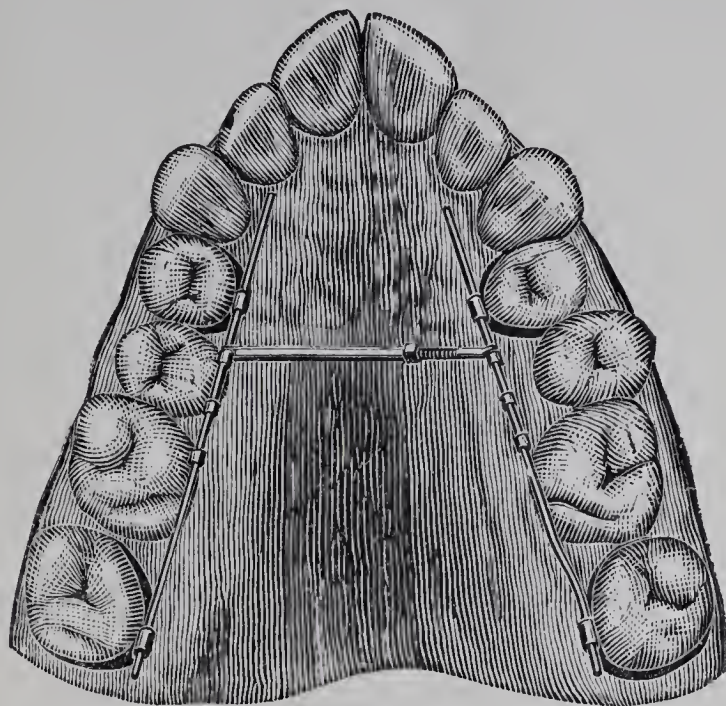


Fig. 22.

Cut 23 shows a modification of this method of expansion,

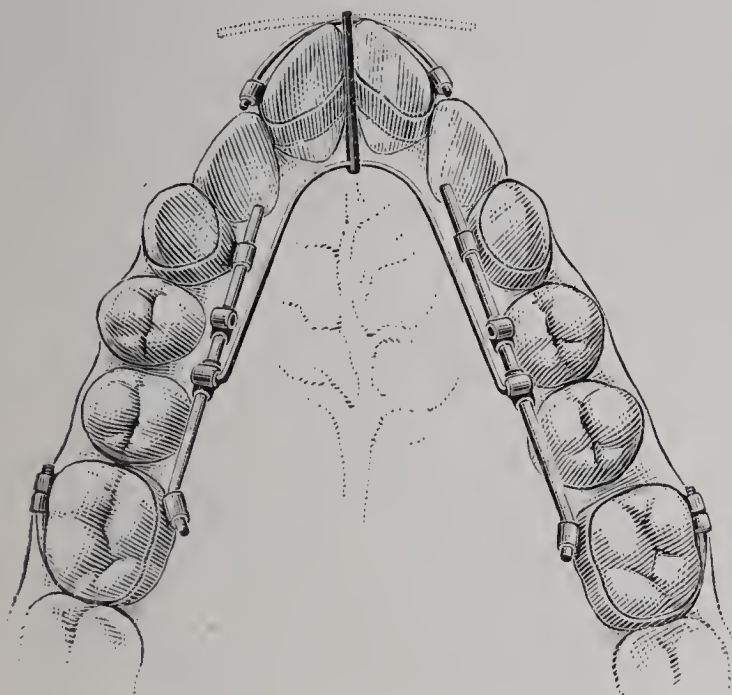


Fig. 23.

the power being derived from one of the levers, bent in the form of the well-known Coffin spring, thus giving us all the advantages of the Coffin method of expansion, without the disagreeable features of the rubber plate. Its chief advantage over the above method being, that it

may be used in expanding the lower arch, without interfering with the movement of the tongue, as would be were the jack-screws used.

The appliance for double rotation shown upon the central incisors in this engraving has already been described, and is

only shown to illustrate how it may be used with advantage in some cases, while the arch is being expanded laterally.

A rubber ligature is seen connecting the expansion spring with the rotating lever, for the purpose of reducing prominence of the incisors during rotation. The extra tubes, soldered at right angles to little collars, slipped upon the bars on each side of the arch, are for the purpose of engaging the ends of the expanding spring, should it be found necessary to transfer the pressure to this part of the arch.

A valuable way of moving a tooth farther than this side-bar, should it be found necessary (for the purpose of better occlusion), is to stretch a rubber wedge between the tooth and the bar, as shown in Fig. 49. This simple method of moving a tooth a little farther than the appliance designed for the occasion will accomplish, will be found very valuable in connection with other parts of this system.

#### § 9.—INWARD.

The movement from without inward, into the line of the arch, may be accomplished as shown in Fig. 24.

The cuspid tooth is banded, and a piece of the gold wire, bent sharply at right angles, hooked into a pipe, soldered to the surface. The other end of the wire is soldered to a pipe, through which the small traction screw is slipped, and against which the nut works.

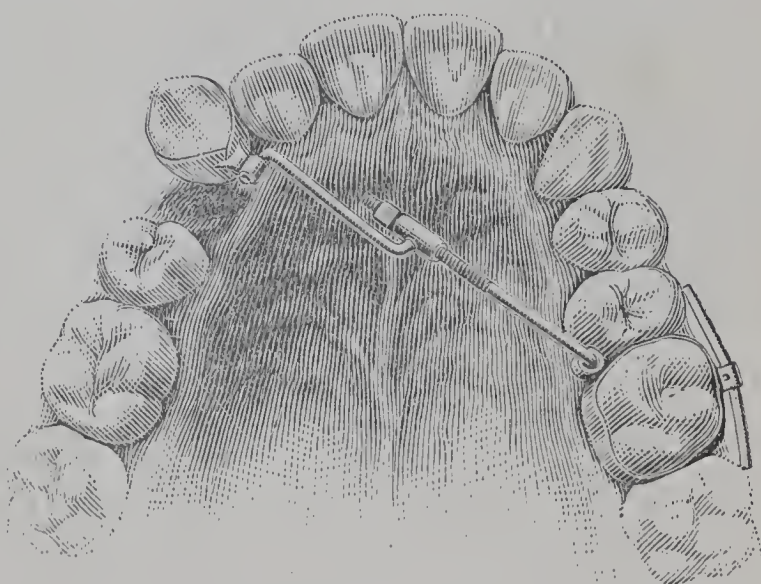


Fig 24.—Inward.

The other end of the traction screw is hooked into a pipe, soldered to a band, encircling the first molar. The anchorage of this tooth is further reinforced by a piece of the



gold wire, which is slipped through a tube, soldered to the buccal surface of this band, the end of the wire resting against the adjoining teeth. Retention is accomplished in a manner similar to that shown in Fig. 17.

If the tongue becomes abraded by the end of the screw, as it emerges from the nut, a very nice way of protecting it, as in all similar cases, is for the patient to lay over the end of the screw a very small piece of the very common article known as chewing gum.

### § 10.—ELONGATION OR FORCIBLE ERUPTION.

The partial or complete failure of a tooth to erupt, frequently necessitates the employment of a corrective appliance. In dental literature, a number of appliances are put on record as accomplishing the forcible protrusion of teeth, the power being derived from screws, springs or ligatures. All these devices are similar in that they are anchored by means of plates, "cribs" or clasps, attached to the same arch which contains the malposed teeth. While the appliance here shown derives its anchorage by being attached to teeth in the opposite jaw, all plates, "cribs," springs, etc., being discarded, thereby rendering the appliance simpler, more compact and cleanly, besides making it far more agreeable for the patient, without in any degree lessening its efficiency.

Fig. 25 shows the principle of this device, as applied in the treatment of a very common form of irregularity, in which the temporary cuspid has been retained too long, causing the permanent cuspid to erupt forward, and above its proper place. In this instance, the temporary cuspid was extracted, and the lower

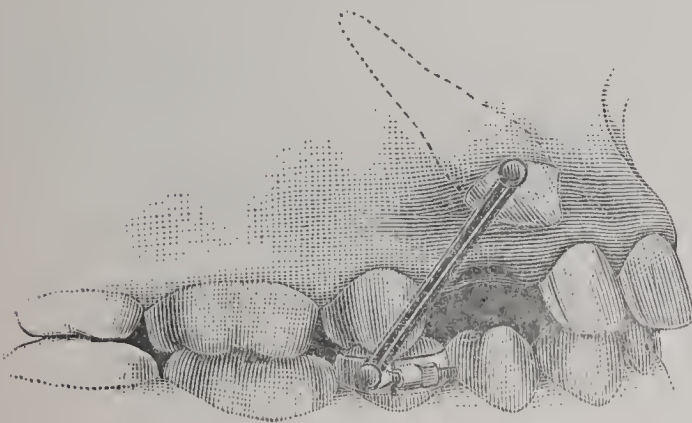


Fig. 25.

second bicuspid was encircled by one of the author's fracture-bands, Fig. 8.

A very small hole was drilled into the cuspid, and a short pin was set with thin cement. A common pin answers the purpose very well, and the hole need not be any deeper than the enamel, if the pin is accurately fitted to it. A rubber ligature was given the patient, with instructions to slip it over the pins, as shown in the engraving Fig. 25. The ligature tends to keep the teeth in occlusion. The anchor tooth is directly opposed by the superior bicuspid, and supported by the inferior first molar and first bicuspid. It will thus be seen that this anchorage is the simplest and most efficient possible to obtain.

The ligature may be worn at nighttime only, so as to interfere with speech and mastication as little as possible, although some patients wear it more or less continuously.

A too strong ligature should not be worn, as it might endanger the life of the pulp; but gentle traction should be used, gradually directing the tooth downward into its proper position.

This simple appliance will be worn without complaint by the patient, as long as it shall be found necessary.

I prefer cutting the ligature from heavy rubber-dam, as suggested by Dr. Black several years ago, or from thin rubber bands, such as are used for holding packages of paper together. First punching a hole with the largest size of the rubber-dam punch, and afterward cutting the outside down to the desired strength with scissors.

The direction of the force to be exerted upon the tooth to be moved will, of course, indicate which tooth in the inferior arch should be selected for anchorage. Should the anchorage fall upon a tooth with no antagonist, there would, of course, be danger of loosening it.

Fig. 26 shows such a case in which the anchorage was modified to suit the condition found.



The case was that of a young lady, seventeen years of age. The deciduous cuspid had been retained too long, causing the permanent cuspid to become imbedded in the alveolar process on the lingual side of the lateral in-

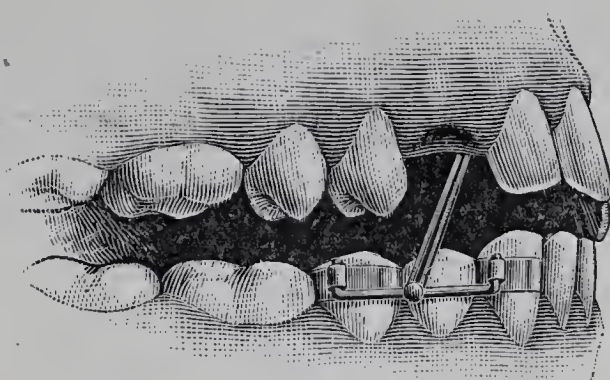


Fig. 26.

cisor, thus necessitating complex movements of the tooth—backward, outward, downward—requiring a very firm anchorage, which was gained by encircling the inferior cuspid and second bicuspid with bands, having delicate tubes attached to their labial surfaces. A piece of the gold wire (Fig. 1, G) of the proper length was provided, the ends of which were bent at right angles and slipped through the tubes upon the anchor teeth, as shown in the engraving, Fig. 26.

The wire fits the bores of the tubes so accurately, that in cutting off the ends which emerge through them, each end spreads sufficiently to prevent its coming out. A pin was soldered to the wire about midway between the pipes and one cemented in the cuspid cusp, as in the case first described.

When the ligature was stretched from pin to pin, as seen in the engraving, the anchor teeth—two in each jaw—were thus made to oppose the cuspid to be moved.

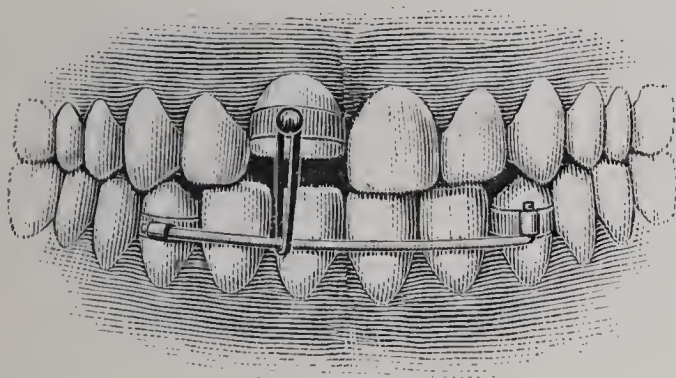


Fig. 27.

Fig. 27 shows another modification of the latter method of anchorage.

The anchor wire was made detachable, and the pin dispensed with, the patient slipping the wire through the ligature and into the pipes upon retir-

ing, and removing it during the day, as the ends of the wire had not been spread. A delicate band, bearing a pin upon its labial surface, was cemented to the tooth to be moved.

Another very useful purpose for which these anchor-wire bands and pipes may be used, as shown in this engraving, is a splint for supporting teeth that have been loosened by salivary calculus, or have been transplanted, replanted, or implanted. The teeth to be fastened should be bound or ligated to the splint.

Fig. 28 shows a case in which the appliance used was very similar to those before described, but this anchorage was

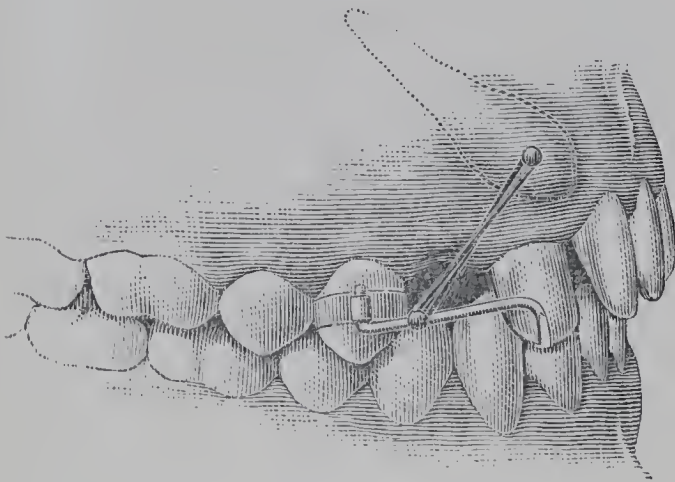


Fig. 28.

attached to the teeth in the same arch in which was located the malposed tooth.

The appliance in detail is as follows: The first bicuspid was banded and a pipe soldered to the labial surface of the band, in which was hooked the

piece of the gold wire, the other end being bent, so as to rest on the cutting edge of the lateral incisor. A pin was soldered to this wire, as in the case before described, and a delicate ligature was then stretched from pin to pin, thus exerting a gentle but constant traction. With this appliance, the ligature is worn continuously. In some cases, where more force was necessary, I used advantageously the combined anchorage herein described. The delicate ligatures shown in the appliance last described, were used in the daytime, to assist the action of and constantly retain what had been gained by the more powerful anchorage on the lower teeth, acting during the night.

We have now completed the description of the principal ways of adjusting the appliances for performing the simple movements of the teeth, and in treating practical cases of irregularities, no matter how complicated or simple, the same principles would be repeated (singly or in combinations), and we herewith append a few practical cases, in order to still



further familiarize the reader with this system, and thus enable him to more easily comprehend its intelligent employment.

Fig. 29 represents a case of irregularities, as a result of a contracted condition of the lips, thus bringing undue pressure on the anterior part of the arch, at the time when the teeth were taking their positions, and forcing them inward as represented.

They were forced outward by the jack-screws resting over spurs, in bands encircling the anchor

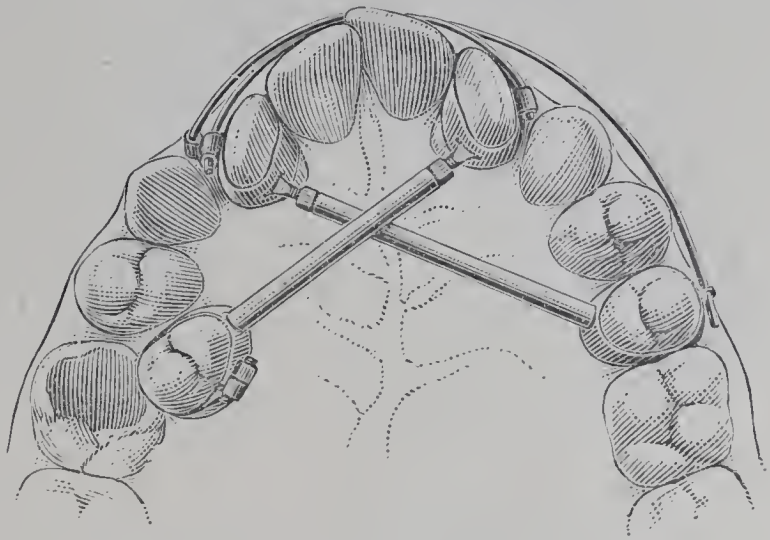


Fig. 29.

teeth; the chisel ends of the screw resting in slots, in bands encircling the moving teeth, exactly as before described in the use of the screw, and now so well shown in the engraving. The teeth were also rotated at the same time with rotating levers, in a manner already described in the description of the use of the rotating levers, and also well shown in this engraving. It will be seen that two rotating levers were used, crossing each other in the centre, the one on the left being anchored by latching it into a hook, soldered to the anchor band on the second bicuspid; the other lever being anchored by hooking the same into one of the little pipes, soldered at right angles to the pipe on the lateral which engages the other lever.

A better way would have been, to have simply tied this end of the lever to the other, but it is here shown to illustrate one of the many ways which circumstances may indicate for securing the end of the lever.

It will be seen that the central incisor also needs rotating; this could, of course, have been easily accomplished by the lever in double rotation, already described, but best shown in Fig. 23. But the same practical result was accomplished by

firmly lacing them to the levers passing in front. After they moved into the desired position, they were retained by uniting



Fig. 30.

with solder bands, encircling all four of the incisors, as shown in cut, Fig. 30, which is a very excellent method of retention, and was first suggested by Dr. Guilford, I believe. They, of course, could have been retained by my

own method, namely: passing a piece of retaining wire from tube to tube, and lacing the central to it. But although very simple and effectual, it would have been more unsightly.

Cut, Fig. 31, shows another case from the author's practice, and one quite frequently encountered, in some of its modifications.

The cuspid has taken an inlocked position, and has forced the lateral outward. It will be seen by studying the appliance, that it served the double purpose of forcing outward the cuspid,

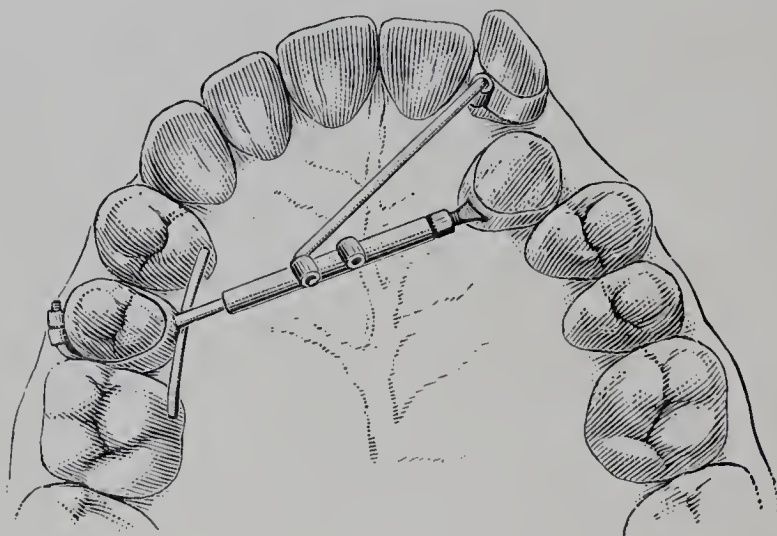


Fig. 31.

and at the same time drawing inward the lateral, by reason of the sheath of the jack-screw being cut shorter, thus allowing it to travel downward over the spur supporting its base, as the nut is tightened until its base finally rests against the band, when the lateral will have been drawn into place, and will still further assist the anchor teeth in resisting the moving cuspids.



This is what is known as reciprocal anchorage, or that of pitting one irregular tooth against another, and is a principle of great value, and should be carefully studied and made use of whenever possible.

The extra pipe shown upon the sheath of the jack-screw was placed there in anticipation of further reinforcing the anchorage, should it become necessary, by hooking another piece of gold wire into the same; the other end being hooked into similar pipes on adjoining bicuspid.

Reciprocal power may, in some cases, be gained with advantage by substituting the gold wire attached to the lateral, with the small traction screw, letters C and B, of Fig. 1.

After these teeth were correctly adjusted, they were retained by uniting the bands with solder and recementing upon the teeth.

Fig. 32 shows another case quite frequently met with; also, the combination of the appliances which were used in their treatment.

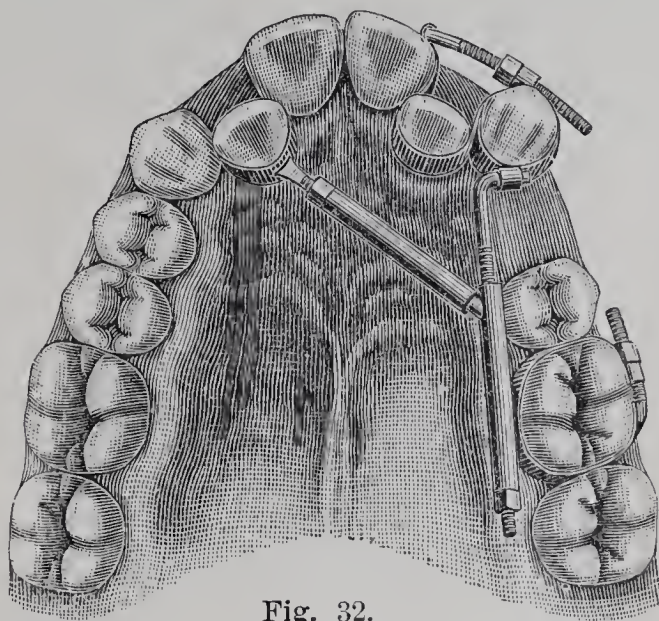


Fig. 32.

The lateral incisors were inlocked, the left cuspid pushed forward, necessitating retraction, and the movement of from in outwards, of the two inlocked laterals. It will be seen that while the large traction screw is drawing back the prominent cuspid, it is assisted by the loop and small traction screw, Fig. 19; acting at the same time in forcing outward the left lateral, thus gaining the benefit of reciprocal anchorage.

It will also be noticed that the other lateral is being forced outward by the jack-screw, the base of which is slipped over a spur, soldered to the sheath of the large traction screw, again making use of reciprocal anchorage by assisting the large traction screw in resisting the force of the cuspid. Of

course the anchorage of the jack-screw might be reinforced, as already described in Fig. 18. Other modifications of this combination will readily suggest themselves.

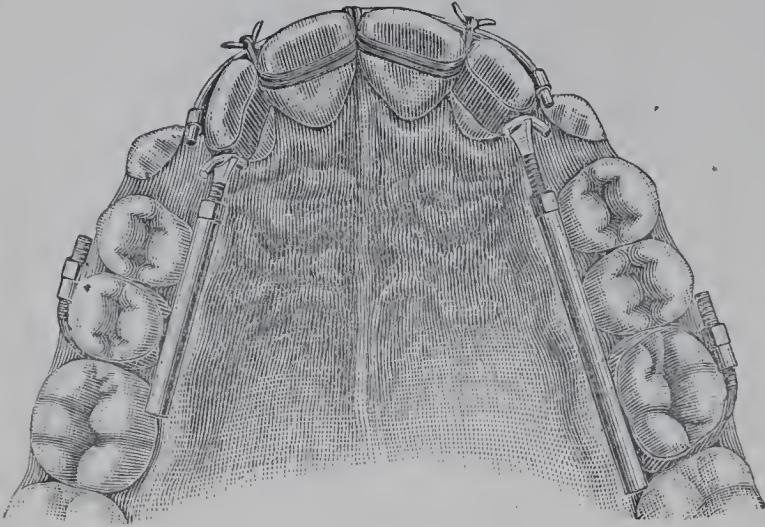


Fig. 33.

Cut, Fig. 33, represents another very common form of irregularity, which often is a result of the habit of contracting the lips.

All of the incisors are pressed inward, not necessarily enough to cause

inlocking of the same, but enough to necessitate the closure of the lower jaw, posterior to the normal occlusion, in some instances causing jumping of the bite. As a result, there is not sufficient room for the cuspids to take their natural positions, but in attempting to do so (a tendency always very strong with them), the laterals are forced still farther inward, as well as partially rotated. The proper treatment is, therefore, to force forward all the incisors to their correct position, thereby making possible correct occlusion, as well as providing space for the cuspids. It will be seen that the rotating levers are applied to the laterals, and the

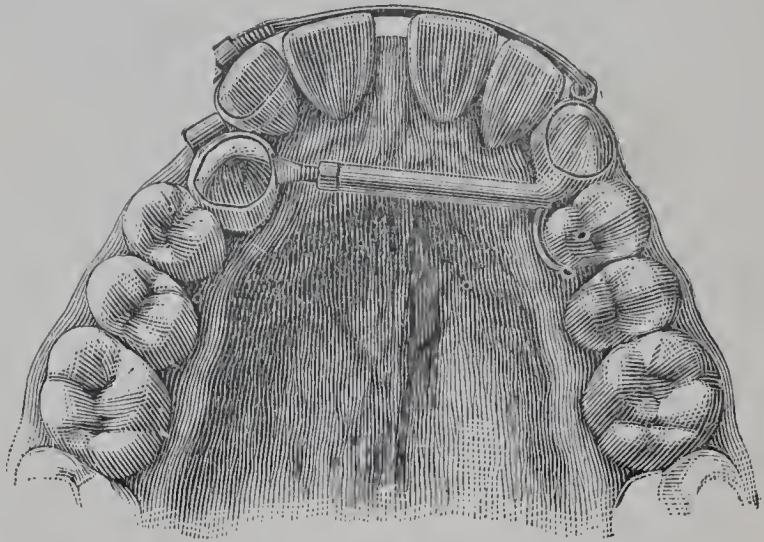


Fig. 34.—Outward.

centrals firmly laced to the same, while all are being forced forward by the jack-screws, soldered to the anchor bands, the chisel ends resting against small half-circular pieces of wire, soldered to the bands on the lateral, which permitted



their rotation. The cuspids were brought downward by the methods shown in Fig. 25.

Fig. 34 shows a cuspid tooth being moved outward.

The base of the jack-screw is *soldered* to a band encircling the opposite cuspid, and reinforced by a spur, resting

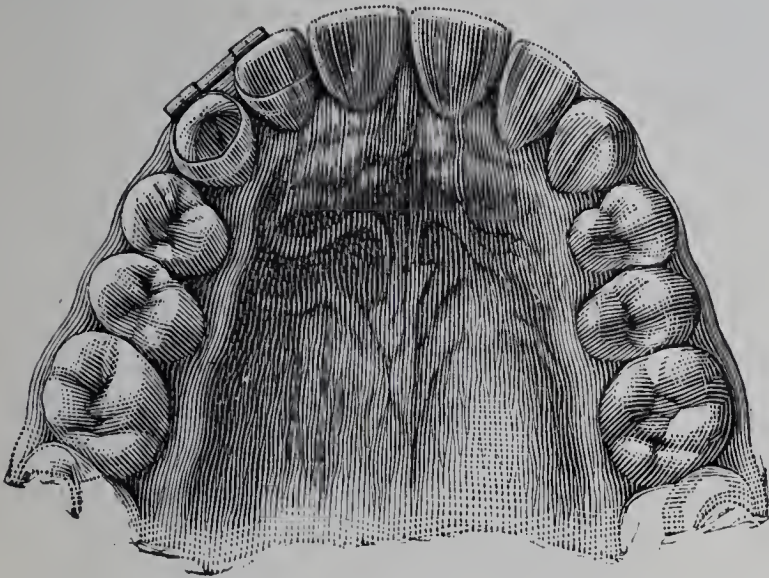


Fig. 35.—Case as Completed.

against the first bicuspid, and also by the large traction screw which is hooked into a pipe, soldered to the labial surface of the band, and passing in front of the incisors through a tube, against which the nut works, soldered to a

band on the labial surface of the lateral incisor.

In this case, the left central and lateral were moved forward in the line of arch, thereby closing the space between the centrals, and, at the same time, providing space for the out-moving cuspid. The large screw was beaten flat and polished before insertions.

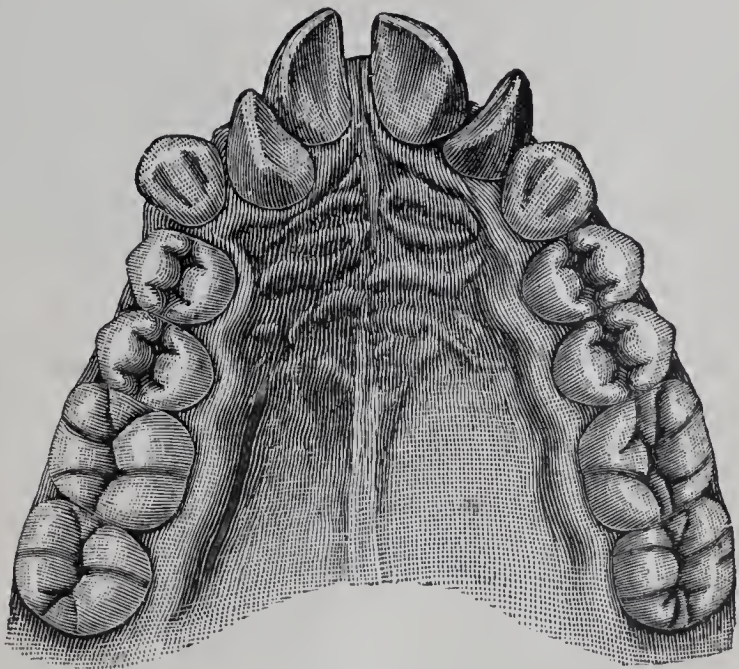


Fig. 36.

Fig. 35 shows the same case after completion.

Fig. 36 shows another case of very marked irregularity, where both centrals and laterals and right cuspid are greatly turned from their natural positions. They are also pushed forward, as well shown in Fig. 37, which represents a side view of the case.



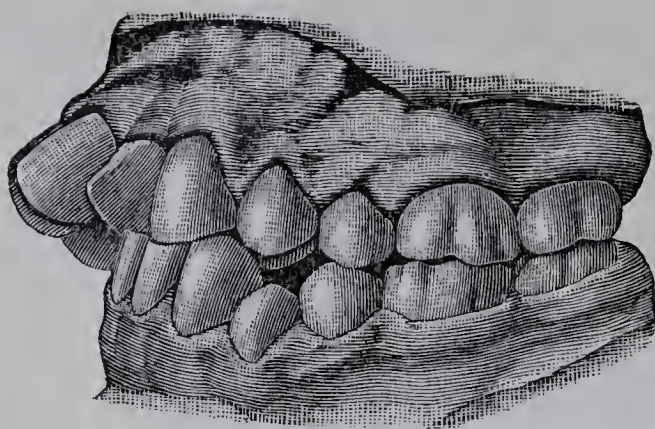


Fig. 37.

extracted. It will also be noticed that the angle of the traction screw on the right is hooked over a spur (soldered at right angles to the band, instead of being hooked into the short pipe, as on the other side), for the purpose of rotating the cuspid as it moved backward, and described in Fig. 15.

The central incisors are being rotated by means of the lever, as described in Fig. 23.

Their prominence was also reduced at the same time, by means of the occipital bandage and traction bar, as described on page 40.

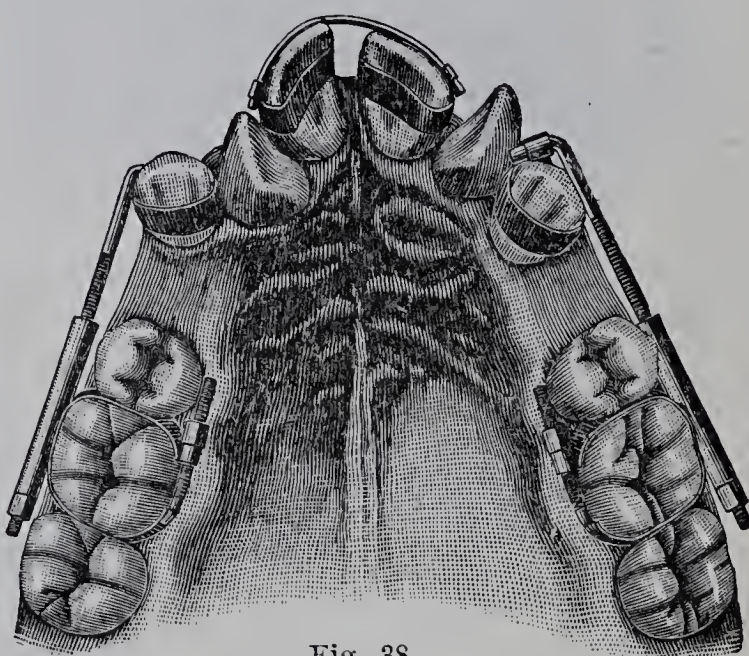


Fig. 38.

Fig. 39 shows the case after being acted upon by the appliances already described.

They were retained in this position by uniting with solder the bands on the centrals together, and recementing upon the teeth, while the traction screws retained the cuspids.

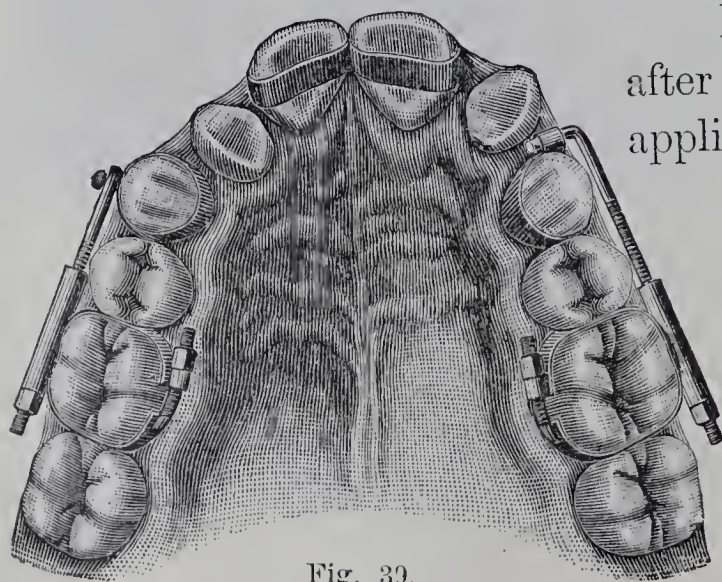


Fig. 39.



The next stage in the operation was the rotation of the lateral incisors, which was accomplished by the rotating levers in the usual way, and described on page 14.

After they were rotated, the bands were removed and united with solder to the bands upon the centrals, and

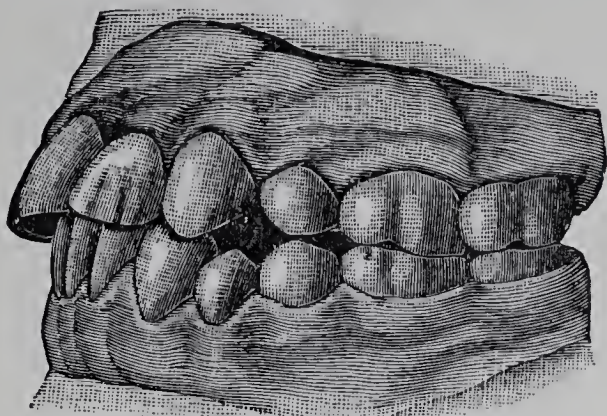


Fig. 40.

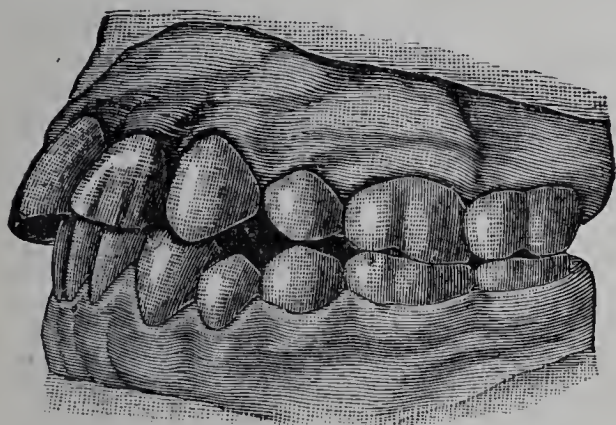


Fig. 41.

reset on the teeth with cement. The traction screws and bands upon the cuspids were removed, and the case then presented the appearance as shown in Figs. 40 and 41.

The retaining bands upon the incisors were worn one year, after which the teeth showed no tendency to return to their former position.

## CHAPTER II.

### § 11.—ANGLE'S REGULATING AND RETAINING APPLIANCES. SET No. 2.

Probably no appliance yet devised for the treatment of dental irregularities, will admit of such universal application

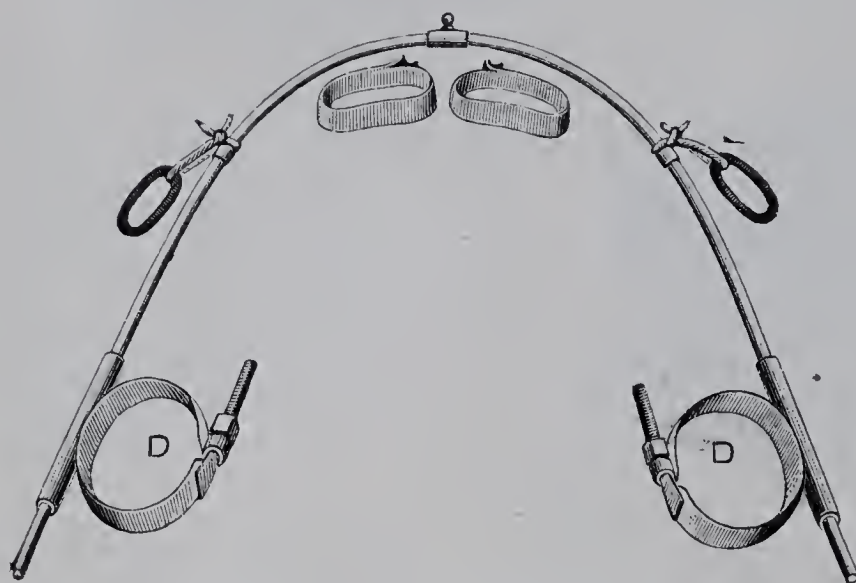


Fig. 42.—Set No. 2, Angle's Appliances.

as this appliance; and, at the same time, inconvenience the patient so little, and prove so satisfactory to the operator; especially in those cases that are best adapted for its use, and

which will be indicated later on.

For with it, we can move out teeth that are inlocked, force into line outstanding teeth, perform the movement of rotation, expand the arch anteriorly, or one or both sides of the arch, compress teeth in their sockets, or elongate or force their eruption, and it is also equally applicable to both arches.

And with it, we can easily treat those common, and usually regarded difficult cases, known as *excessive protrusion of the incisors and cuspids*, and represented in Fig. 43.

It was for this class of cases the appliance was originally devised.

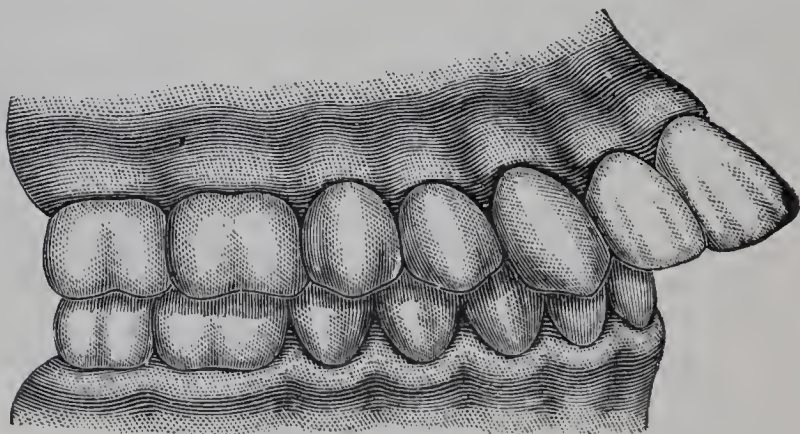


Fig. 43.—Excessive Protrusion.



We will, therefore, first describe its use in their treatment.

The anchor clamp band D, Fig. 42, is slipped over the anchor teeth, usually the first molars, and adjusted so that the pipes on the buccal sides of the teeth will carefully line with the arch.

The nuts are now tightened, and the band carefully burnished, until they fit accurately the teeth they encircle. The wire arch, Fig. 42, is carefully bent, to conform to the shape of the dental arch, provided the dental arch is correct in form; but if it is contracted, or the teeth occupy irregular positions, no attention is paid to the form of the existing arch, but an ideal arch is formed for the case. Or, in other words, the

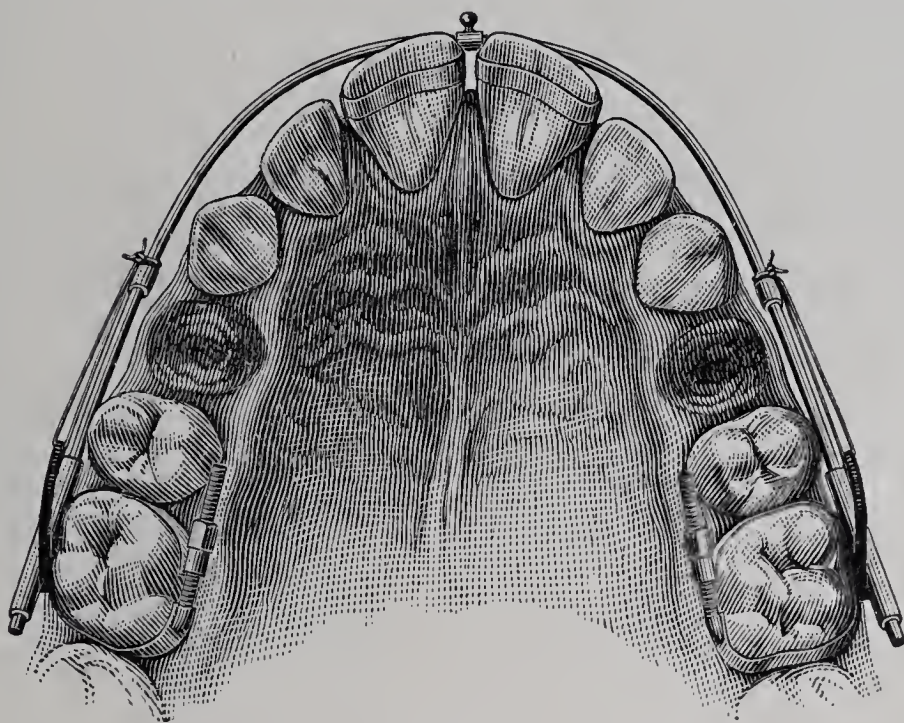


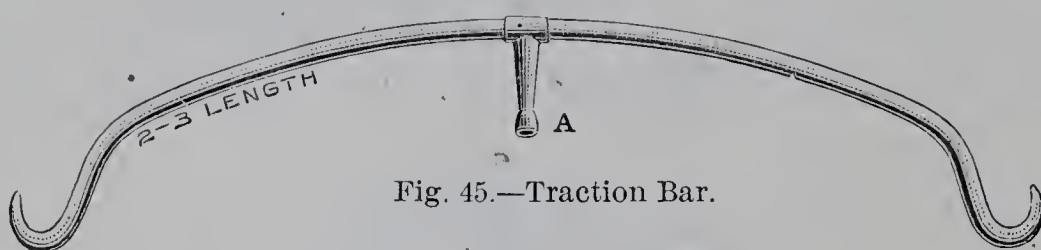
Fig. 44.

wire arch is bent exactly to the form that we wish the teeth to be arranged when the operation is completed. The ends of the ideal arch are now slipped through the pipes on the molars. The anterior part of the arch is kept from sliding up and impinging upon the gums, by resting in suitable niches, formed in the delicate bands, Fig. 42, encircling and cemented to the centrals or lateral incisors. It is shown in position upon the teeth in Fig. 44.

The power to be exerted in moving backward these teeth is derived from heavy elastic bands, attached to a cap, cover-

ing the back part of the head, as in Fig. 46, thus gaining occipital anchorage, instead of depending upon the anchorage of the molar teeth, which is never enough in these cases to withstand the great strain necessary to force backward the protruding teeth, but are always, when so relied upon, tipped forward more or less, and faulty occlusion established. The occipital anchorage prevents this annoyance.

Fig. 45 represents a traction bar, used for conveying the force from the occipital bandage and distributing it to the wire arch.



A spur or standard will be seen in the centre of this bar, provided with a socket in the end, which, when in position, engages a small ball, soldered to a delicate tube, encircling the center of the wire arch, as is shown in Fig. 44.

If the reader is familiar with the appliance, so far described, it will be seen that the force received from the occipital bandage is distributed to the wire arch, through the ball and socket joint.

The ends of the traction bar may, therefore, be moved in any direction, without interfering with the pressure from the bandage. The advantage of this attachment is that, in consequence of the freedom of motion, any jar or shock upon the traction bar will not be transmitted to the tender teeth. As the bandage and bar are to be worn only at night, shocks from contact with the pillow would be very liable to occur and occasion pain, were it not that the bar is provided with this freedom of movement. This is a point of advantage which, I think, all will appreciate, and one possessed by no other device. The usual method is to attach the traction bar, or its equivalent, to a swaged or vulcanite cap covering, and firmly resting against all the teeth to be moved.



As the heavy rubber ligatures of the bandage act during the night only, provision must be made to hold through the day what is gained at night. This is effectually accomplished by delicate rubber ligatures, which are slipped over the distal ends of the pipes on the molars, stretched forward, and tied with silk ligatures in front of the small collars which encircle the wire arch, opposite the cuspids, as seen in Fig. 44. These collars being rigid, prevent the ligatures from sliding back, thus exerting a gentle but constant traction on the moving teeth, and prevent them from springing back and interfering with the healing process of repair.

Another advantage of the device is, that not only the prominence of the teeth is reduced, but teeth that are irregular are gradually forced to take regular positions, and conform to the shape of the ideal arch (as it is forced backward through the pipes on the molars), something impossible with devices having fixed caps of vulcanite or gold.

Still another advantage is, that if the arch needs expanding, as is frequently the case, it may be easily accomplished

at the same time the teeth are being moved backward, by lacing to the wire arch such teeth as need to be moved outward.

For the bandage proper, as a result of much experimenting, I believe that shown in Fig. 46 to be much superior to any other.

It consists of a stiff, round, wire



Fig. 46.

band, large enough to encircle the head, and having coarse black silk net (as shown in the engraving) sewn over it. This netting is known as black silk fish-net, and is used by ladies for draping dresses, and may be procured at any dry goods store at a very small expense. The great advantage of this style of band is that the pressure is equally distributed over all parts of the bandage, thus admitting of much pressure from the bands without inconvenience.

The elastic bands seen in the engraving are those commonly used in holding packages of paper together. They may be procured at any stationer's, or will be furnished when desired. They are about three and one-half inches in length and three-eighths inches in width. One end is passed through one of the meshes of the net and looped around the wire, and carried down and hooked over the end of the traction bar, all so well shown in the cut that it will be readily understood. These ligatures may be doubled after the patient has become well accustomed to wearing them.

Fig. 47 shows a common silk traveling cap, which may be used and is preferred by some, although we prefer the former.

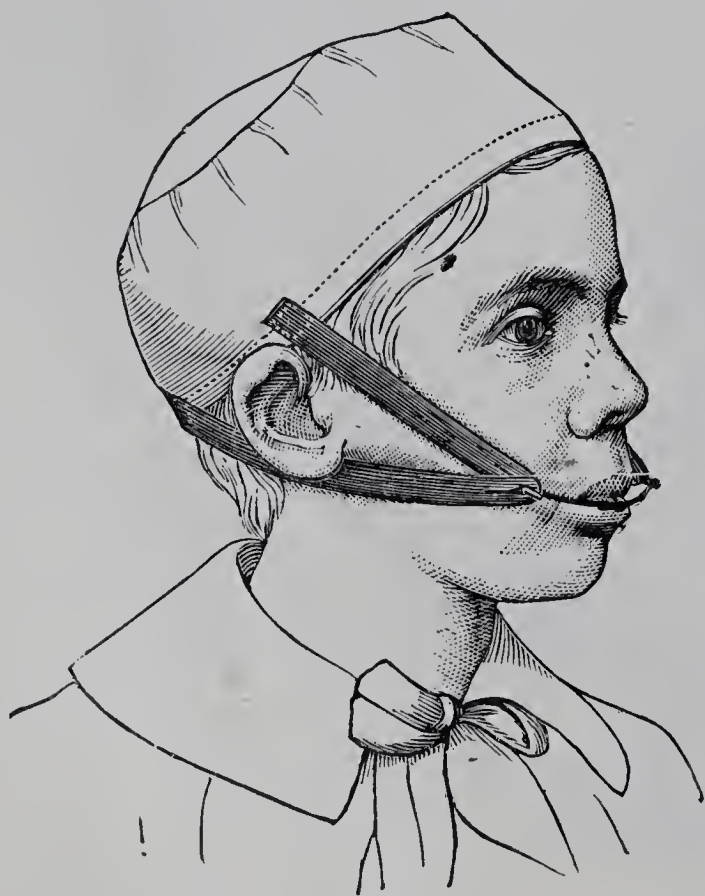


Fig. 47.—Occipital Anchorage.

For this style of bandage two ligatures should be attached to the cap on each side, one above and one below the ear, as shown in Fig. 46. If the bands be of equal width, the force will be exerted in the direction of the meatus of the ear. This is the point to which, in most cases, the force should be directed. In many cases, however, the



teeth should be compressed in their sockets, as well as drawn backward. This is easily accomplished by doubling the strength of the upper, and attaching it at a point on the cap as far forward as desired.

Again, if elongation of the teeth be necessary, as they are moved backward, the lower ligature only is used, dispensing with the upper, or using a very light one.

After the teeth have been moved into the desired position, they are effectually retained by the wire arch (the head gear, traction bar, and delicate ligatures, are, of course, dispensed with), and keeping the same by passing a delicate drill through the pipes on the anchor teeth, and inserting neatly fitting pins into the holes thus made, same as in Fig. 17.

This method of retaining is very effectual, and, as long as the appliance is so worn, the teeth cannot change their proper positions.

But it has the serious objection of being unsightly, and, as it has been already worn some considerable time, the patient will usually become tired of wearing it, and ask for its removal. And as it is of the greatest importance in these cases that the teeth be firmly retained for a long period (at least one year), it becomes necessary that we resort to some other device, less objectionable to appearances.

After much experimenting, I find the appliance shown in Fig. 48 quite effectually meets all requirements. It is retention by means of the occipital bandage, but should never be applied as soon as the movement of the teeth have been completed, but only after the other appliance has been worn at least two months, or long enough to allow the teeth to have become thoroughly rested in their new positions, and firmness somewhat established.

The arch, bands and pipes upon the molar teeth, as well as bands encircling the incisors, are now all removed and the teeth thoroughly cleansed. After which, careful impressions are taken of both upper and lower jaws, from which accurate models are made. Careful comparison is to be made, from

time to time, with the natural teeth and these models, in order to detect any unfavorable changes, should they occur.

The next retaining appliance is now adjusted, and is to be worn at nighttime only, thus allowing the patient entire freedom from all appliances during the day. It consists of a piece of German silver or gold wire, long enough to pass in front of the incisors and cuspids, and carefully bent, so that it will rest in contact with them. Two short pieces of gold wire, from Set No. 1, are soldered at right angles to this wire, opposite the front of the central incisors. They are long enough to admit the ends being bent over the cutting edges of the incisors, and the hooks so formed will prevent the appliance sliding upward against the gum. The device is prevented from sliding laterally by a short piece of the wire being placed across the heavy wire at a point between the incisors where it is soldered. This spur should rest in the depression between these teeth; the other end passes slightly beyond the wire arch, where it is to engage the socket of the standard of the traction bar.

All accurately shown in the engraving. It is adjusted by slipping it into position upon the teeth, and, if it has been

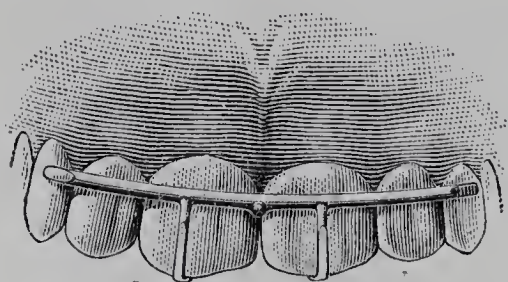


Fig. 48.

carefully made, will not be displaced after the head gear and traction bar have been adjusted. The elastic bands in the head gear must be quite delicate, exerting only sufficient pressure to prevent the teeth from moving forward, which must be carefully watched until the proper tension is gained.

The above appliance must be worn every night for three or four months, after which every alternate night will usually be found sufficient; and finally it may be worn one or two nights in the week only, or as the judgment of the operator will determine. But it must be insisted upon that it shall be worn regularly. If it is found that the patient will not ob-



serve system in wearing this appliance, the former method of retention should be again resorted to.

So much for the use of No. 2 appliance in the first class of cases, *i. e.*, excessive protrusion.

We now come to consider the use of the No. 2 appliance in mixed cases of irregularities.

Fig. 49 represents another class of irregularities directly

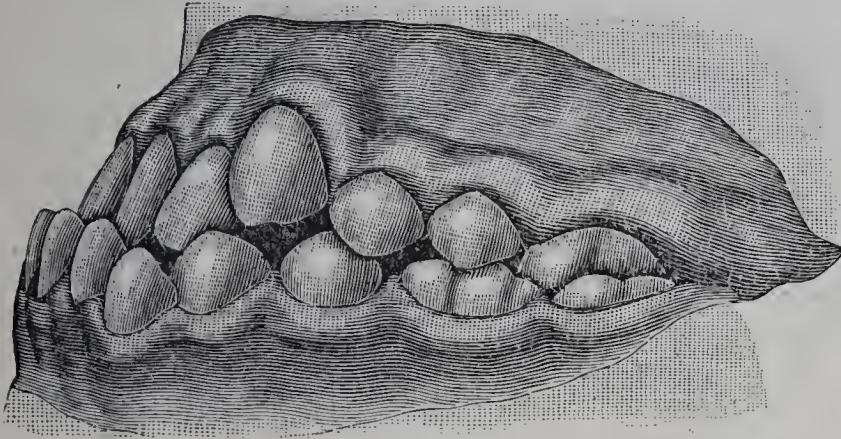


Fig. 49.

opposite that shown in Fig. 43, for in this class we have protrusion of the lower front teeth, always accompanied more or less with prominence

of the inferior maxilla, and a lack of sufficient prominence of the upper front teeth. In this class are oftentimes found our most difficult cases, but when taken at the proper age, and the prominence be not too excessive, they may be quite easily treated, and the facial appearance of the patient show greater improvement than in any other class of cases.

The plan followed in the treatment of this case is one which we think will admit of quite universal application. It is to accomplish :

1st. Expansion of the superior arch anteriorly; 2nd. Contraction of the inferior arch anteriorly; 3rd. The retraction of the inferior maxilla.

Fig. 50 shows a view of the upper teeth, with the ap-

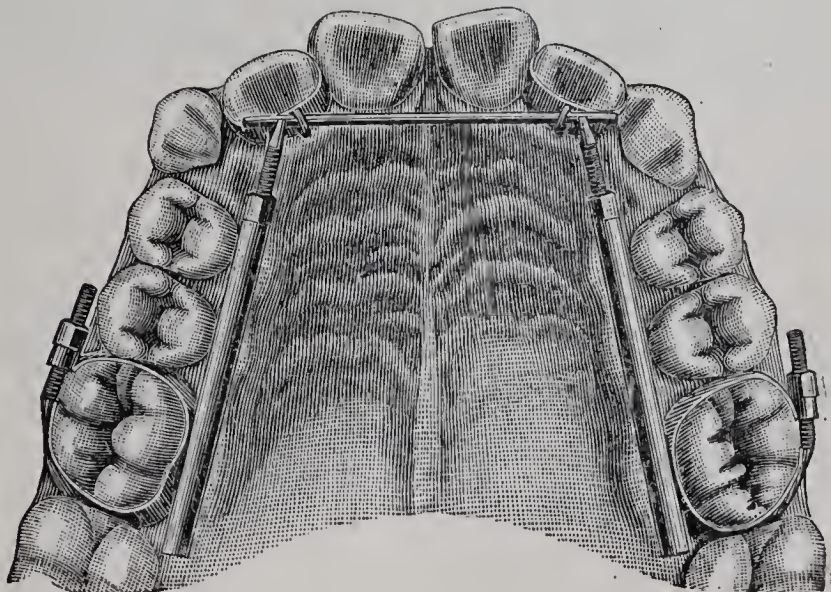


Fig. 50.



pliance for expanding the arch anteriorly in position. It will be seen that by so doing space will be gained for the irregular incisors and erupting cuspids.

The jack-screws are soldered to clamp bands encircling the first molars, the chisel ends are notched and engage a piece of the gold wire passing through delicate pipes, soldered to the lingual surfaces of bands encircling the lateral incisors as shown.

The nuts were tightened every third day, moving the teeth out as far as desired, in about three weeks. While this was being done the lower jaw was being acted upon, the first bicuspid having been extracted, the lower incisors and cuspids were moved backward, until the cuspids occupied the space from which the bicuspid had been removed, as shown in Fig. 51.

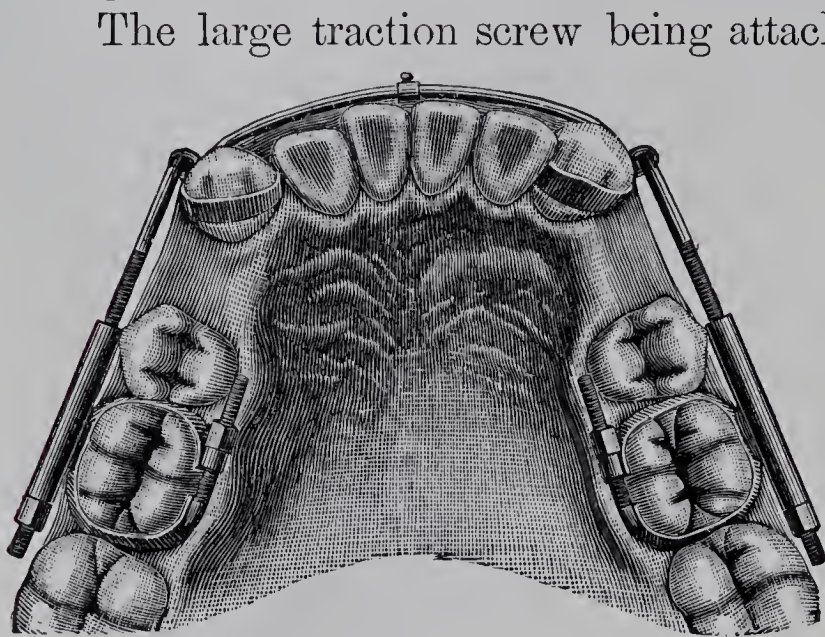


Fig. 51.

which encircled the first lower molars, and the angles of which were hooked into small staples soldered to bands upon the distal angles of the cuspids, while a piece of the gold

wire attached by solder connected these bands and passed in front of the incisors.

The screws were assisted in moving the teeth backward, by the headgear, heavy elastics and traction bar, the socket in the standard of which engaged the little ball shown upon the gold wire midway between the bands. The object of the power so gained was twofold. First, to cause a retraction of the maxilla, which we think it did to a noticeable degree; second, to assist the traction screw in moving back the in-



cisors and cuspids, thereby lessening the danger of displacing the anchor teeth, something always to be guarded against.

The nuts were tightened every second day enough to occasion a slightly snug feeling.

The results are highly satisfactory, and were accomplished quite rapidly, and with but little inconvenience to the patient. Fig. 52 shows case completed.

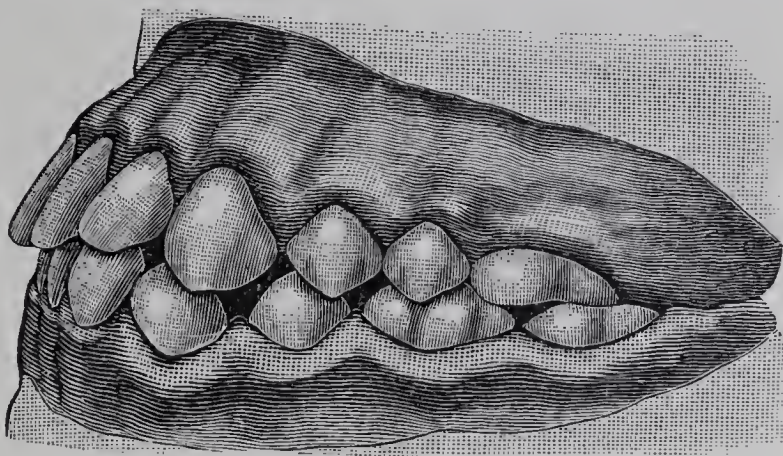


Fig. 52.

In treating some of these cases it may be found of advantage

to continue pressure upon the maxilla by attaching the elastics from the headgear to hooks soldered to a swedged metallic cap, fitting accurately to the chin, as recommended by Dr. Allen. The object being, by continued pressure, to bend the jaw at the angles, but only in very young patients do we believe this even possible. We think that in two cases we have succeeded.

## § 12.—EXPANSION.

In cases where expansion of the arch is necessary, we have found this appliance to be very valuable, especially in young patients, before the teeth have become very firm in their sockets or where great force is not necessary; and especially where the teeth are somewhat irregularly arranged in the arch.

The appliance is adjusted the same as described in cases of protrusion, and shown in Fig. 44, the head-gear, traction bar and delicate ligatures of the side being dispensed with. The arch is bent to take the shape in which we wish the teeth to be arranged at completion. The teeth to be moved are laced tightly to the arch, and the ligatures changed about.

twice a week, when it will be found that the force of the spring exerted by the wire arch will soon move the teeth outward, causing them to arrange themselves to conform to the exact shape in which the wire has been bent. And if the teeth were originally irregular, they will be compelled to take regular positions.

This plan, of finally perfecting the arrangement of the teeth in the arch, I have found of great advantage in such cases as represented in Figs. 36 and 29, after they have been acted upon by the screws and levers.

If the arch is to be expanded anteriorly only, as in case Fig. 53, the bands for holding the anterior part of the arch in position are placed upon the cuspids, instead of central incisors. The incisors are now laced to the arch, which is prevented from being forced backward through the pipes on the anchor teeth by closing the bore at their distal ends with a pair of flat-nosed pliers. The spring of the arch will soon move the malposed teeth forward. If it is desired to move the arch forward, in order to exert more pressure, the ligatures are cut, the arch removed, and two short pieces of wire slipped into the anchor pipes and forced back against the pinched ends, when the arch is again slipped into its former position, and the ligatures replaced upon the incisors.

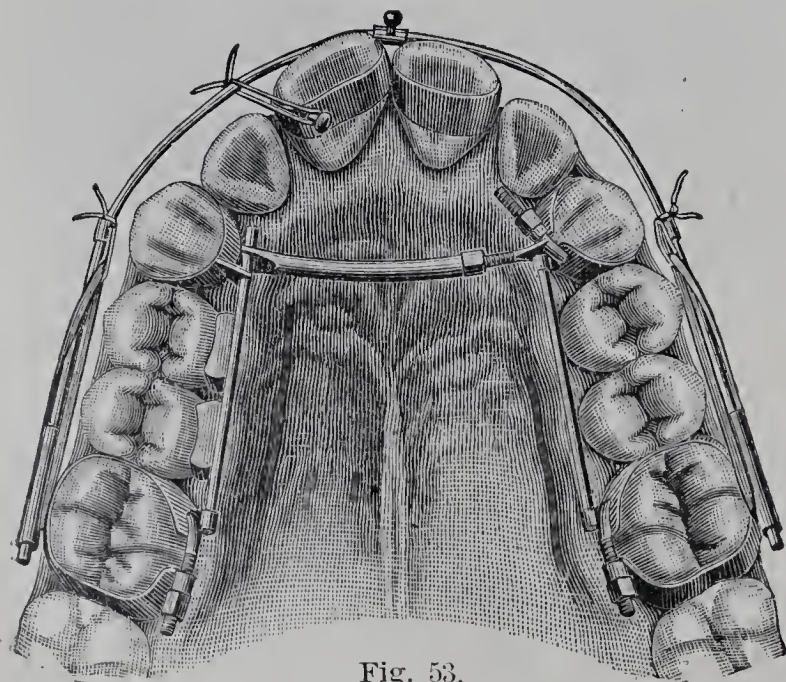


Fig. 53.

described in connection with set No. 1.

This method of expansion, while so excellent in the cases just described of younger patients, is not so applicable after the age of seventeen or eighteen years, when we prefer the methods of expansion already de-



In very obstinate cases, we have derived great advantage by combining these methods, as shown in Fig. 49.

An excellent way of performing rotation of a tooth, not requiring much force, is to encircle the tooth with a band, and solder a spur upon the lingual corner, requiring to be moved outward. A ligature is now passed around the wire arch and spur, twice, and securely tied. It should be renewed vice a week, or a rubber wedge drawn between the arch and lingual surface of the tooth, which will intensify the pressure for two or three days longer.

### § 13.—OUTWARD.

A tooth requiring to be moved out of inlock, where great force is not required, may be easily accomplished with this appliance by tightly lacing it to the wire arch, and occasionally renewing the ligatures, or making use of the rubber wedges, which are drawn between the lingual surfaces of the adjoining teeth and wire arch.

### § 14.—ELONGATION.

The movement of elongation may also be performed with this appliance by firmly tying a ligature about the tooth to be moved, or a spur cemented into the same, and again firmly tied to the wire arch. The spring of the arch thus being made to exert force in moving the tooth downward to the desired position.

### § 15.—INWARD.

An outstanding tooth may be readily forced inward, into the line of the arch, by drawing a rubber wedge between it and the wire arch, and firmly lacing the adjoining teeth to the arch.

## CHAPTER III.

### FINAL SUGGESTIONS.

*First.*—Before beginning the treatment of a case, have a clear conception of what is necessary. This can only be done by a careful study of both models and natural teeth, facial expression, history, etc.

*Second.*—Have regular times for seeing your patient; be punctual yourself and insist upon punctuality from the patient, and always carefully compare the original models at each sitting.

*Third.*—Exercise such care and judgment in the adjustment of the appliance that delays from slipping, breaking or changes will be unnecessary.

*Fourth.*—The best result in moving a tooth is only obtained by recognizing the regular and proper amount of force necessary to stimulate absorption. The habit of applying a great amount of force at irregular intervals serves only to defeat the object to be gained, for it retards the process of absorption, causes unnecessary pain, provokes inflammation, thereby endangering the life of the pulp. It also strains the appliance, causing much delay and pain to the patient in repairing the same.

*Fifth.*—If the screw is being used in the movement of a tooth, and the patient be an intelligent one, he may be provided with a wrench, and instructed to tighten the nut morning and evening, thus greatly economizing the time of both patient and operator; yet the patient should be seen at regular intervals; usually twice a week will be sufficient.



*Sixth.*—It is doubly important that the patient shall observe care in brushing and cleansing the teeth while wearing these regulating appliances, and we believe the best dentifrice to be used for this purpose is prepared chalk, followed by castile soap; and if the appliances are kept properly cleansed, they will take on a beautiful bronze color, far more pleasing to the appearance than when made of gold, besides possessing much greater strength.

*Seventh.*—In adopting this system the operator should study carefully, and thoroughly familiarize himself with the names and uses of all the parts of these appliances, and, after a little experience, he will be able to readily apply them to any case, for the system is complete within itself.

It is needless to say the rubber plate has no place in this system. We believe that it should be a relic of the past. The only instance where we make use of a plate in any form is a neatly-fitting skeleton plate made of aluminum, and swaged to fit the roof of the mouth, after the arch has been expanded and used as a retainer.

*Eighth.*—The wire arch in No. 2 Set is made to contain all the spring possible. It is, therefore, necessarily quite hard, and may be broken; consequently, care should be taken in bending to the desired shape. It is made long enough to encircle the largest arch, necessitating clipping off the ends when used in circling smaller ones.

The three small pipes found on it are held in position by means of a *soft solder*: should any of these become loosened, they should be resoldered, being careful to not apply more heat than necessary in melting the solder, or the temper in the arch will be destroyed.

*Ninth.*—In applying the jack-screw, the sheath should always be used as long as possible, turning the nut close up to the chisel end of the screw before cutting the sheath to the desired length.

*Tenth.*—In soldering the attachment to the band, we have found the best plan is to first slightly fuse the solder upon the band, then holding the piece to be united in contact with it, and again applying heat sufficient to unite them. If the piece be one of the pipes, an easy way of holding it is by passing the point of an old excavator into the bore, holding the band with a pair of pliers. A little experience will enable the operator to make any of these attachments, and adjust the appliance in a very few minutes. Never use more solder than is necessary, or apply heat enough to burn the bands.

*Eleventh.*—After the appliance has been adjusted, the surplus cement should be removed and the appliance polished with pumice, and burnished.

*Twelfth.*—We believe there is an impression among a large number of dentists that the treatment of irregularities should be deferred until after the age of fifteen or thereabouts. But we are convinced that the impression is erroneous and fruitful of much harm, for by this time many cases have become complex and exceedingly difficult to treat, and leaving results which it is impossible to eradicate.

I believe the best time to begin the treatment is as soon as the appearances of irregularity are manifest; then, with delicate and simple appliances, gradually assist the tooth to take its natural position. We would not be understood as needlessly interfering in those cases where it is apparent that nature will correct the deformity unaided. But we refer more especially to the inlocked, twisted and overlapped condition, which usually becomes worse and complicates those to be erupted.

A few days with a proper appliance will often accomplish what it may require many months if left until the whole dental apparatus is involved.

The author's favorite device for these specially early cases is shown in cut, Fig. 50. It is so simple and delicate that it will not be objected to by the little patient. It consists



of a pipe soldered perpendicularly to the side of one of the clamp bands, into which is hooked a piece of the gold wire, which is swung around and allowed to rest against some suitable tooth, to assist the anchor tooth, and a rubber ligature slipped over it.

*Thirteenth.*—In using the No. 2 appliance in the retraction of protruding teeth, the teeth will sometimes show a tendency to bunch or overlap, which may be remedied by lacing them firmly to the wire arch, or lacing them as directed for performing rotation with the No. 2 appliance.

And, again, some of the teeth may tend to elongate, which should be prevented by encircling with bands having suitable niches, in which rests the wire arch, the same as those already encircling the central incisors; or the bands may be removed from the central incisors and pressure transferred to the elongating teeth by similar bands.

*Fourteenth.*—In making the attachments, the pipes should always be flattened, with a round file, at the point of contact, thus making the attachment stronger and easier to accomplish, as well as the appliance more compact. Always carefully avoid applying heat to either the jack or traction screws proper, or their temper will be ruined.

Finally, we believe, after thoroughly understanding this system, the operator will be enabled, in every instance, to form a combination with these appliance which will enable him to perform the movement of a tooth more easily than by any other appliances yet devised, and we invite comparison.

EDWARD H. ANGLE,  
No. 13 Syndicate Block,  
Minneapolis, Minn.

October 10th, 1892.

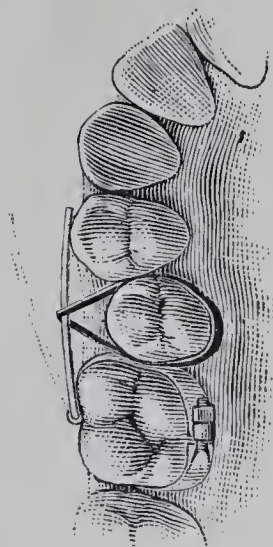


Fig. 54.





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ages of which feature it is needless to comment on.

**Fifth.**—Its use entirely dispenses with moulding sand, and  
all the vexations and difficulties incident to the making of a  
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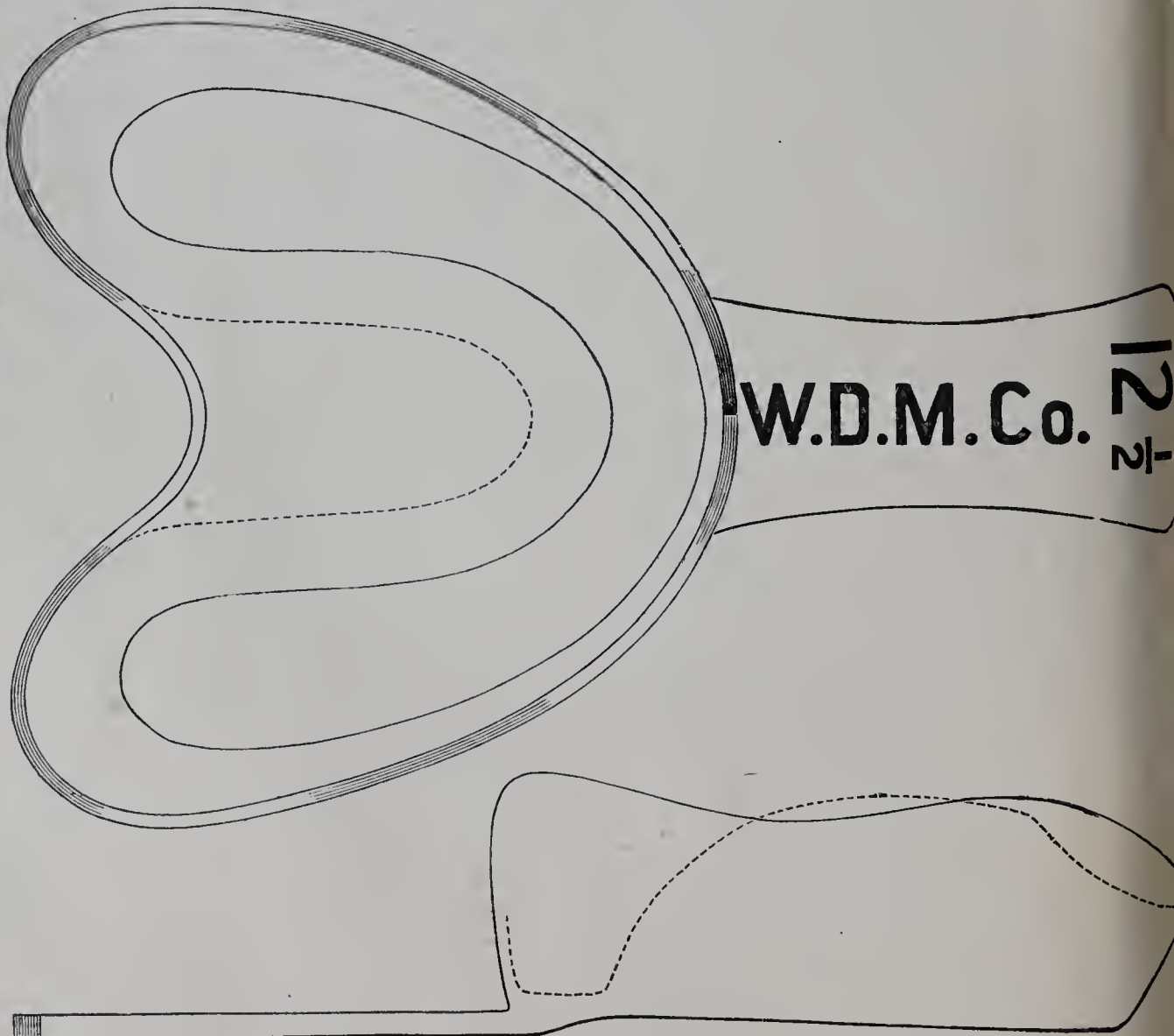
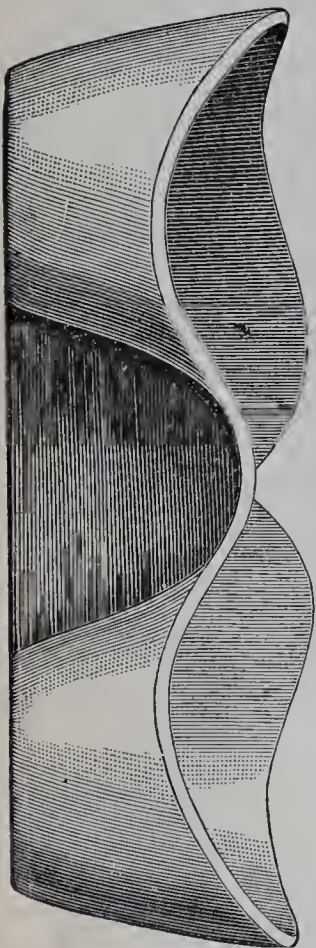
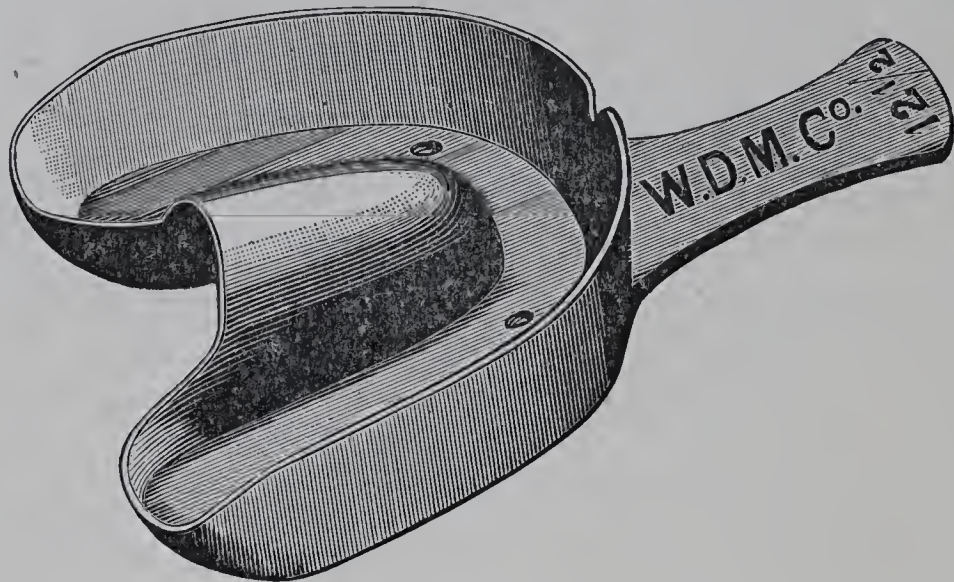
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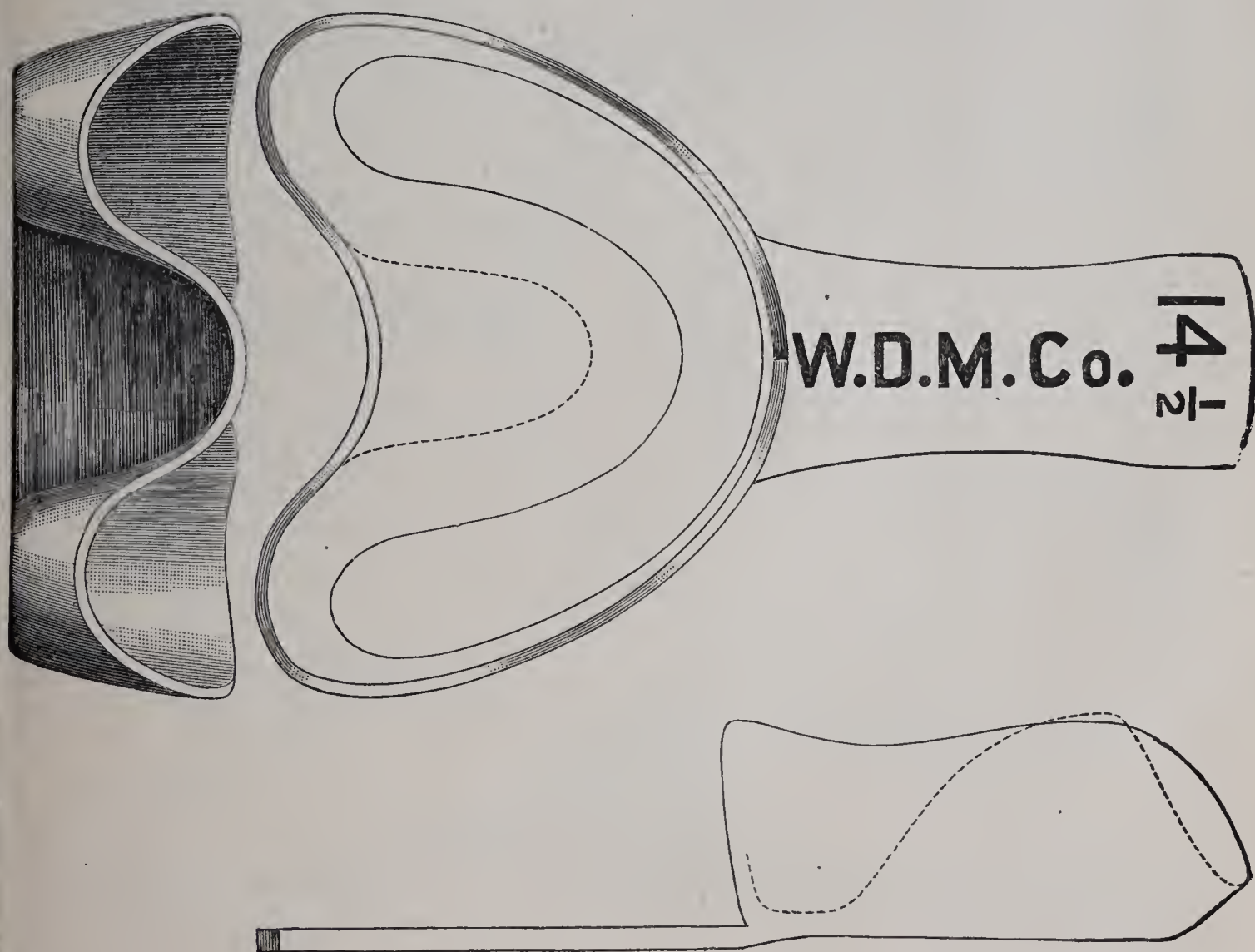
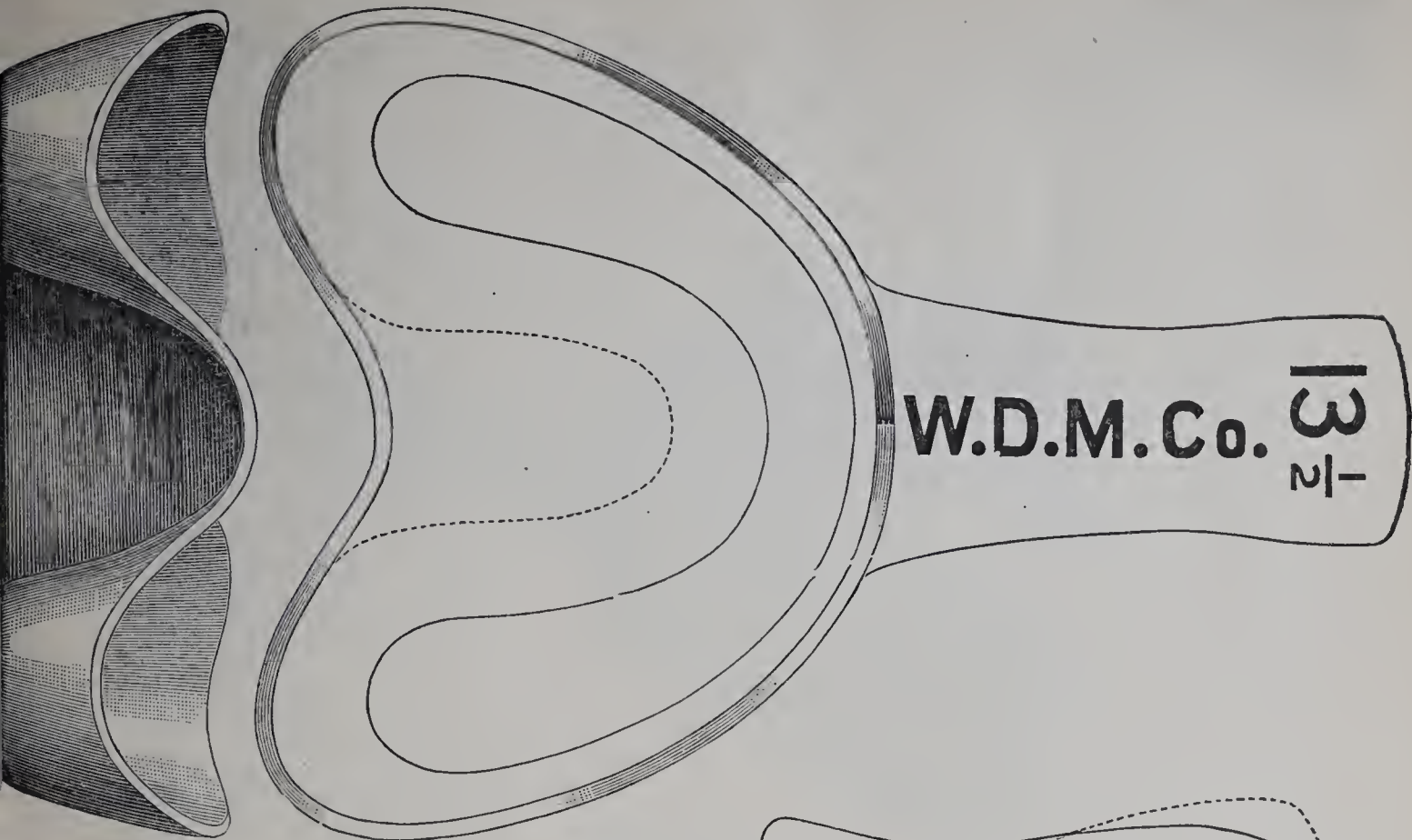
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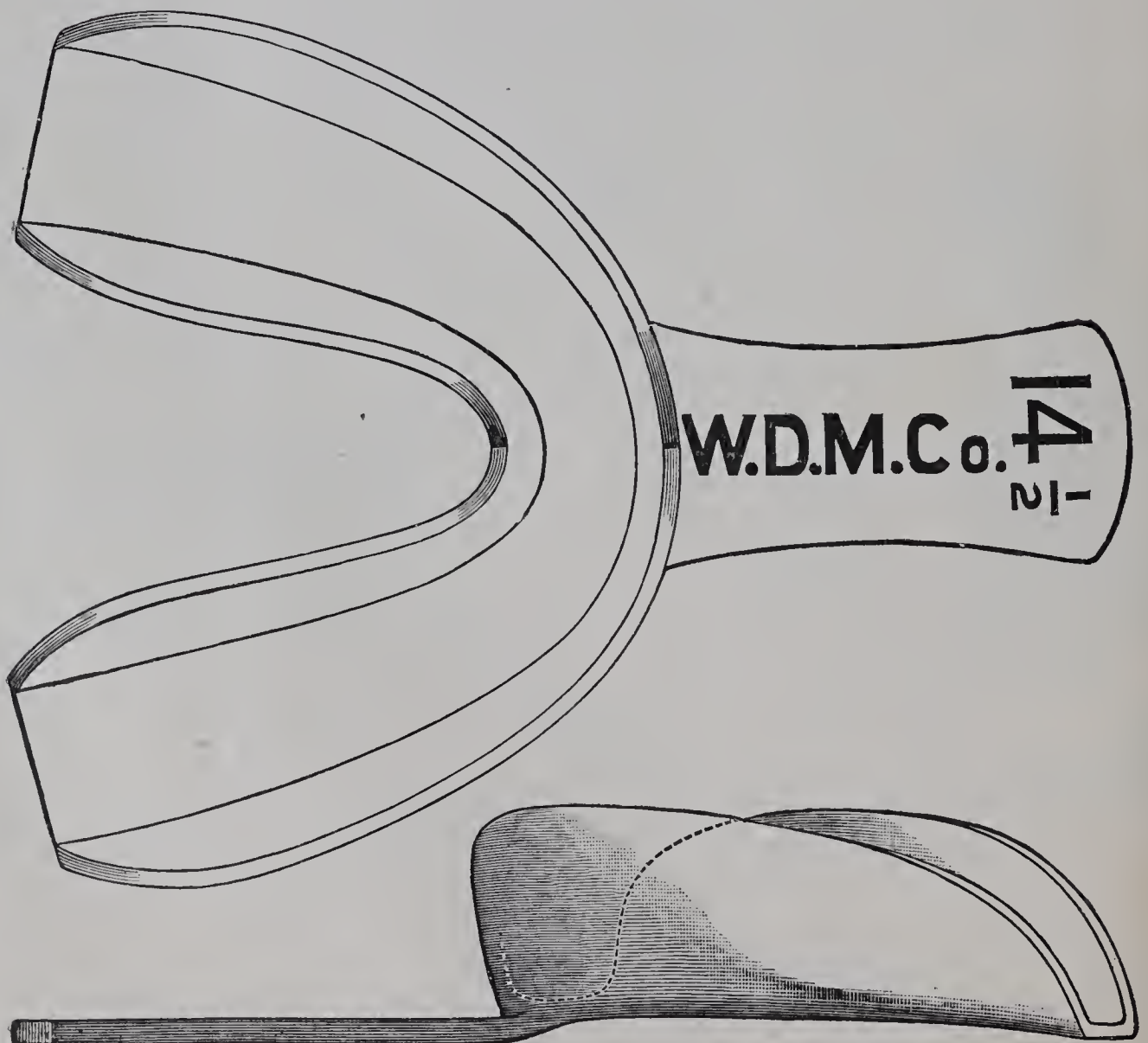
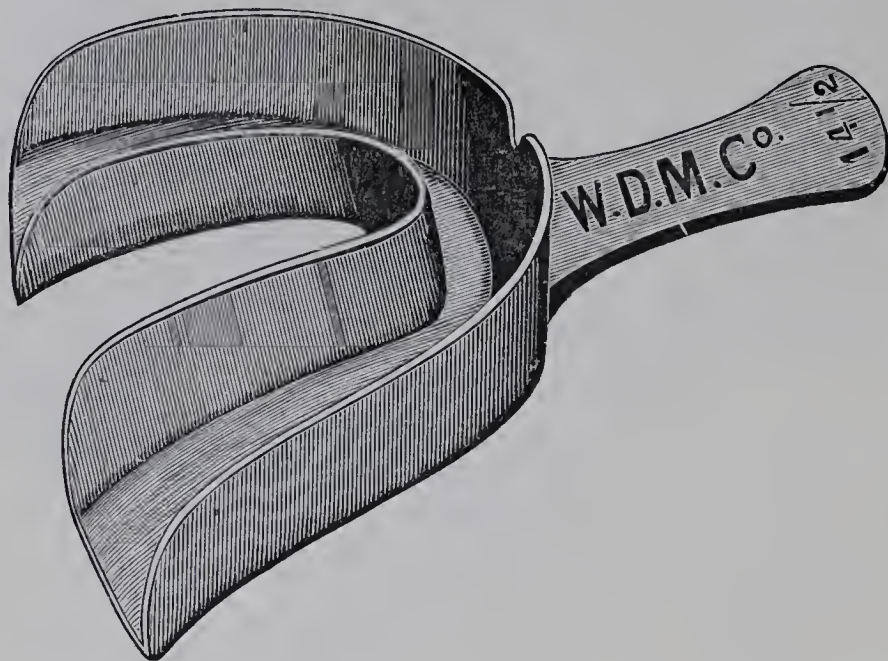




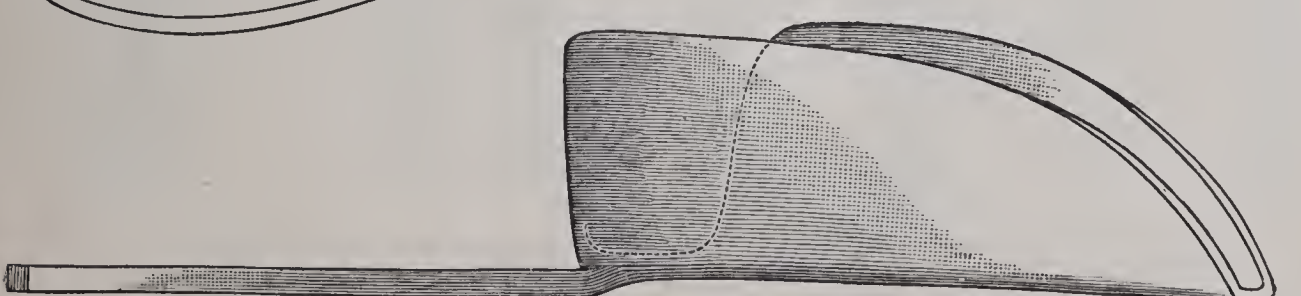
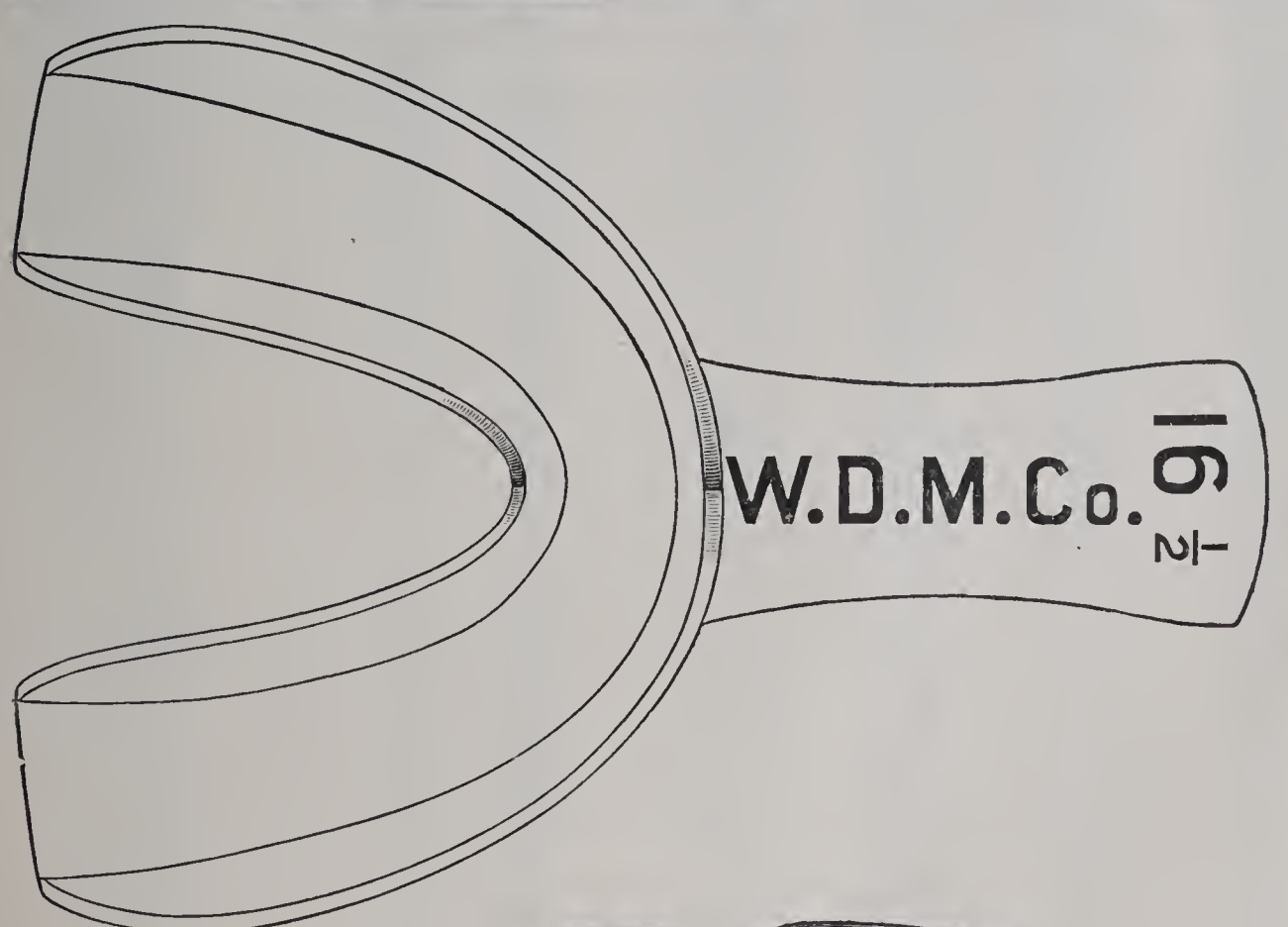
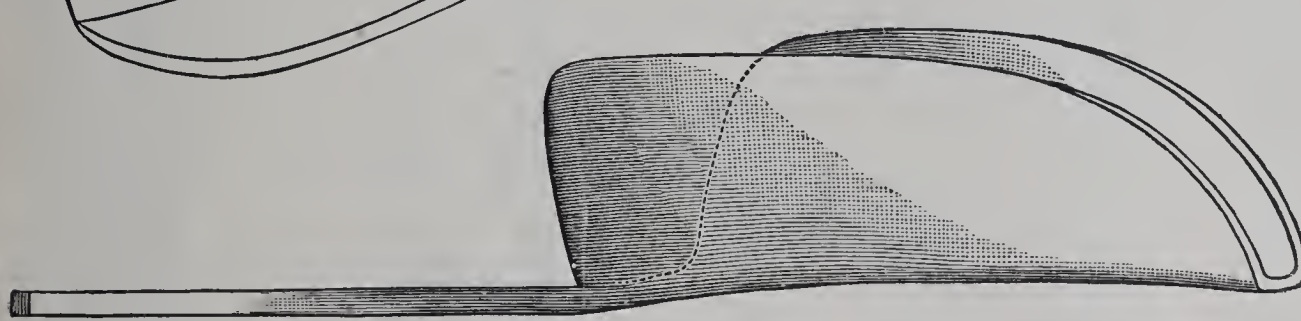
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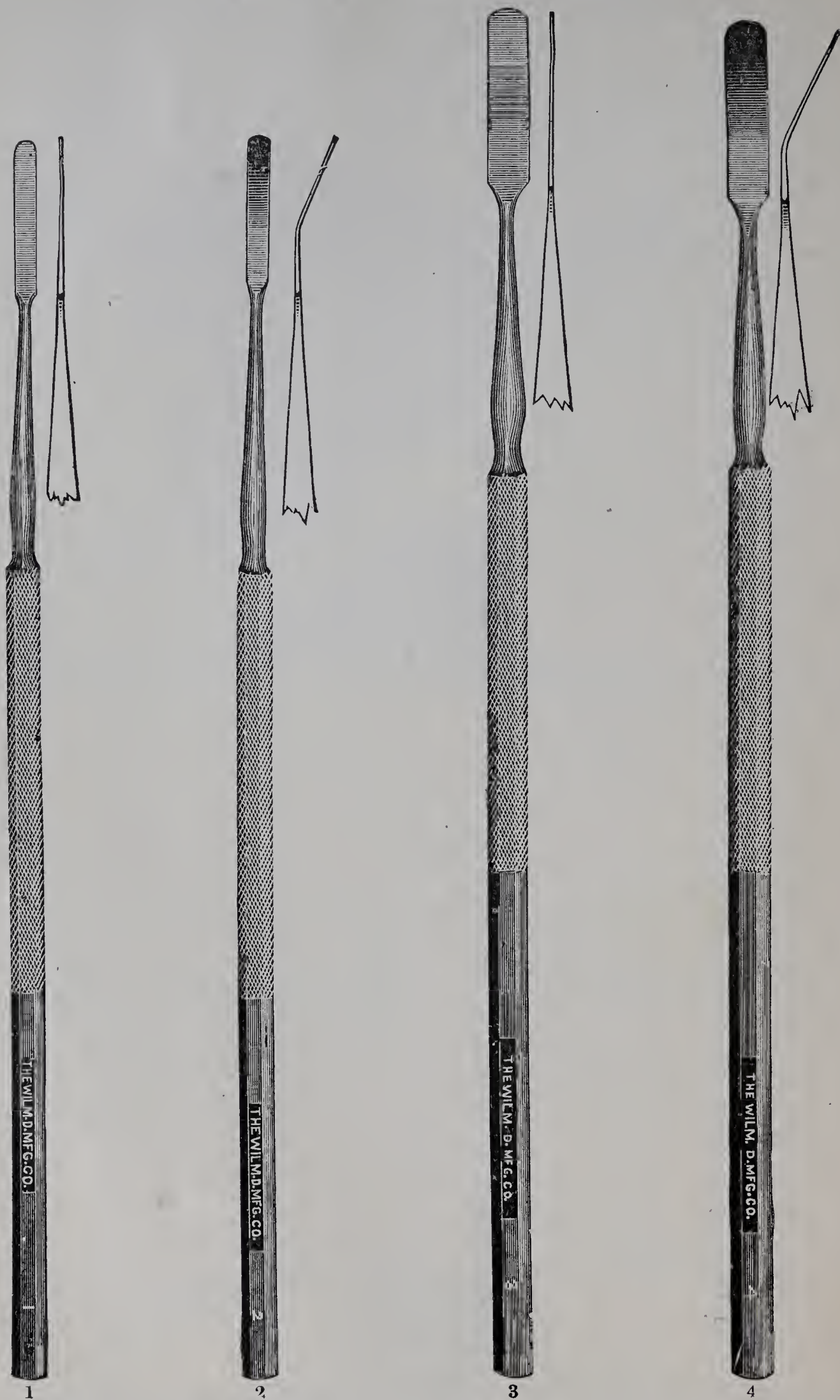
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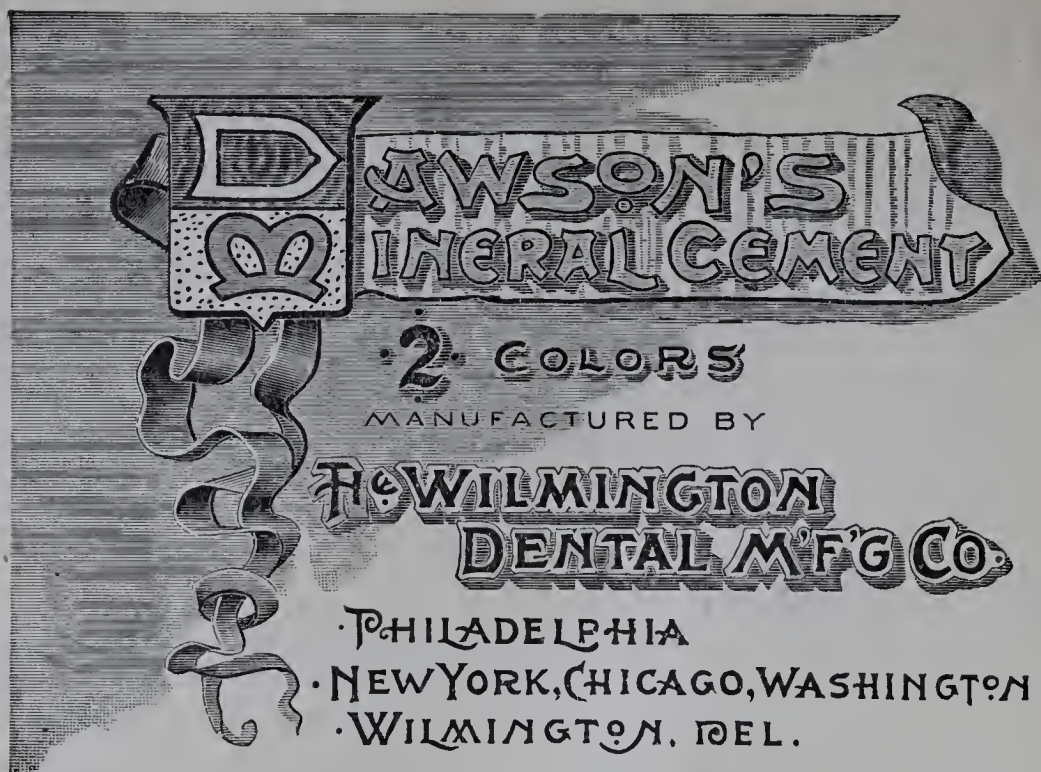
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